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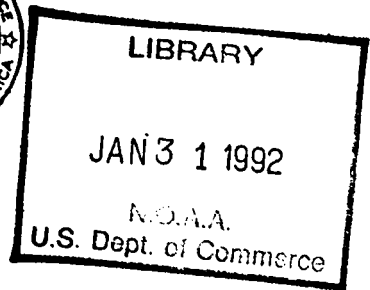
PRECISE TRIANGULATION ALONG THE
NINETY-EIGHTH MERIDIAN

KANSAS-OKLAHOMA BOUNDARY TO ALICE, TEX.

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CONTENTS.

	Page.
General statement.....	3
Field work.....	3
Anthony base net to Lampapas base.....	3
Lampapas base to Seguin base.....	3
Seguin base net to Alice base.....	4
Statement of adjustments.....	4
Anthony base net to Lampapas base.....	4
Lampapas base to Seguin base.....	5
Seguin base net to Alice base.....	6
The North American datum.....	7
Explanation of positions, lengths, and azimuths and of the North American datum.....	7
Use of horizontal control data.....	9
Explanation of tables.....	11
Arrangement of tabulated data.....	11
Explanation of lengths.....	11
Azimuth and back azimuth.....	11
Accuracy of data indicated in tables.....	12
How to find the data desired.....	12
Related publications.....	12
Geographic positions.....	14
Oklahoma-Kansas boundary to Lampapas, Tex.....	14
Lampapas to Seguin, Tex.....	28
Seguin to Alice, Tex.....	32
Elevations.....	36
Oklahoma-Kansas boundary to Lampapas, Tex.....	36
Lampapas to Seguin, Tex.....	38
Seguin to Alice, Tex.....	39
Descriptions of stations.....	40
General notes in regard to station marks.....	40
Oklahoma-Kansas boundary to Lampapas, Tex.....	40
Lampapas to Seguin, Tex.....	53
Seguin to Alice, Tex.....	58
Conversion tables.....	64
Sketches.....	73
Index.....	83

ILLUSTRATIONS.

Fig. 1. Standard marks of the U. S. Coast and Geodetic Survey.....	40
Fig. 2. Index map showing areas in the United States covered by published triangulation and traverse which have been rigidly computed on the North American datum.....	72
Fig. 3. Index map showing the boundaries of each of the following sketches, Figures 4 to 12.....	73
Fig. 4. Precise triangulation, Kansas-Oklahoma boundary to Kingfisher, Okla.....	74
Fig. 5. Precise triangulation, Kingfisher to Chickasha, Okla.....	75
Fig. 6. Precise triangulation, Chickasha, Okla., to Bowie, Tex.....	78
Fig. 7. Precise triangulation, Bowie to Stephenville, Tex.....	77
Fig. 8. Precise triangulation, Stephenville to Lampapas, Tex.....	78
Fig. 9. Precise triangulation, Lampapas to Austin, Tex.....	79
Fig. 10. Precise triangulation, Austin to Seguin, Tex.....	80
Fig. 11. Precise triangulation, Seguin to Beeville, Tex.....	81
Fig. 12. Precise triangulation, Beeville to Alice, Tex.....	82

PRECISE TRIANGULATION ALONG THE NINETY-EIGHTH MERIDIAN.

Kansas-Oklahoma Boundary to Alice, Tex.

GENERAL STATEMENT.

The arc of precise triangulation, the results of which are here given, extends south along the ninety-eighth meridian from the vicinity of Anthony, Kans., near the Kansas-Oklahoma boundary, to the vicinity of Alice, Tex. These data were originally published and fully discussed in three reports, namely, in Appendix 4 of the Report of 1903, Appendix 5 of the Report of 1905, and Appendix 5 of the Report for 1911. Since these publications are now exhausted, it has become necessary to reprint the results, and this is done here as concisely as possible.

FIELD WORK.

ANTHONY BASE NET TO LAMPASAS BASE.

The field work on that section of the arc between the Anthony base net and the Lampasas base was executed in 1902 under the direction of Assistant William Bowie. The field organization consisted of a building party and two observing parties. Mr. Bowie, who was in charge of the whole organization, acted as observer in the first observing party, and Assistant O. W. Ferguson, who was in direct charge of the second observing party, acted as its observer. The building party was under the direction of Signalman J. S. Bilby.

The parties were organized at Bowie, Tex., early in March, 1902, and progressed northward toward Anthony, Kans., which was reached by the building party in July and by one of the observing parties in August. As soon as the connection with the work of the preceding season, near Anthony, had been completed the parties returned to Bowie, Tex., and worked southward until the Lampasas base was reached. Operations at the beginning of the season were commenced at Bowie, Tex., rather than at Anthony, Kans., in order that the party might have more favorable weather than would otherwise have been encountered. During the season observations were completed at 75 precise stations and at several supplementary stations, thus extending the ninety-eighth meridian triangulation 444 miles (715 kilometers) to the southward.

LAMPASAS BASE TO SEGUIN BASE.

During the months of November and December, 1903, and the early part of January, 1904, a party under the direction of Assistant O. W. Ferguson extended the triangulation southward from the southern limit of the Lampasas base net to the line Serita-Stockdale,

which is the southern limit of the Seguin base net. The field organization consisted of two observing parties and a building party. Mr. Ferguson acted as observer in the first observing party, and Assistant W. H. Burger was in direct charge of the second party and acted as observer. The building party was in charge of Signalman J. S. Bilby. The progress of the season, measured along the meridian, was 112 miles (180 kilometers).

SEGUIN BASE NET TO ALICE BASE.

During November and December, 1904, and January, 1905, a party under the direction of Assistant W. H. Burger extended the precise triangulation from the southern limit of the Seguin base net to the Alice base. The field organization consisted of an observing party and a building party. The observing party was under the immediate charge of Mr. Burger, who also acted as the observer, and the building party was under the direction of Signalman J. S. Bilby. The progress of the season, measured along the meridian, amounted to 105 miles (170 kilometers).

STATEMENT OF ADJUSTMENTS.

The entire precise scheme was adjusted in sections by means of least squares, using the direction method, and giving all directions unit weight. No local adjustments of directions were made, since by the method of observing employed these were unnecessary.

ANTHONY BASE NET TO LAMPASAS BASE.

The adjustment of the triangulation between the Anthony base net and the Lampasas base is completely described in Appendix 4 of the Report for 1903. The adjustment was divided into four sections between bases or base nets. The first section extends from the line Indian-Spradling to the line Burson-Wingard and includes both the Bowie and Elreno base nets, with the length equation written directly from base to base.

The second section is from the line Burson-Wingard, fixed in length by the adjustment of the first section, to the lines Rutherford-Miller and Miller-Fowler, fixed in length and direction as a part of the Anthony base net, as shown in Appendix 3 of the Report for 1902 (now superseded by Special Publication No. 70).

The third section extends from the line Indian-Spradling at the south edge of the Bowie base net, the length of which had already been fixed by the adjustment of the first section, to the line Gibson-Gleason at the south edge of the Stephenville base net, the length equation being between the line Indian-Spradling and the Stephenville base.

The fourth section extends from the line Gibson-Gleason to the line May-Gabriel, at the south edge of the Lampasas base net. This adjustment includes the Lampasas base net with the length equation ending on the base.

The probable error of an observed direction is given by the formula

$$d = 0.6745 \sqrt{\frac{\sum v^2}{c}}$$

in which Σv^2 is the sum of the squares of the corrections to the directions and c is the number of conditions. The probable errors for the four sections are given in the following table:

Sections.	Probable error.	Maximum correction to a direction.
Bowie base to Elreno base.....	$\pm 0^{\circ}33$	1^{\circ}40
Elreno base net to Anthony base net.....	$\pm ^{\circ}36$	0^{\circ}84
Bowie base to Stephenville base.....	$\pm ^{\circ}29$	^{\circ}70
Stephenville base to Lampasas base.....	$\pm ^{\circ}23$	^{\circ}60
Average for all, Anthony base net to Lampasas base.....	$\pm ^{\circ}30$	.....

The statistics as to closures of triangles and in regard to the mean error of an angle, $a = \sqrt{\frac{\Sigma \Delta^2}{3n}}$ (in which $\Sigma \Delta^2$ is the sum of the squares of the closing errors of the triangles, and n is the number of triangles), are given in the following table:

Section.	Number of triangles.	Number of plus closures.	Number of minus closures.	Average closure.	Maximum closure.	Mean error of an angle.
Bowie to Elreno.....	51	131	119	1^{\circ}19	4^{\circ}48	0^{\circ}97
Elreno to Anthony.....	16	9	7	1^{\circ}05	2^{\circ}17	^{\circ}69
Bowie to Stephenville.....	44	23	21	^{\circ}90	2^{\circ}50	^{\circ}68
Stephenville to Lampasas.....	32	15	17	^{\circ}56	2^{\circ}09	^{\circ}45
Whole season.....	143	78	64	^{\circ}94	4^{\circ}48	1^{\circ}72

¹ One triangle closes exactly.

² Weighted mean.

In solving the normal equations in each section of the figure adjustment, the length equation was assigned to the last place, so that the discrepancy in length, after all the conditions relating to triangle closure had been satisfied, became known. These discrepancies are shown in the table below. A plus sign before the discrepancy means that the first base named is longer as measured than as computed through the intervening triangulation from the second base mentioned.

Bases.	Discrepancy in seventh place of logarithms.	Discrepancy expressed as a ratio.
Anthony-Elreno.....	+ 7	1:620,000
Elreno-Bowie.....	-64	1:88,000
Bowie-Stephenville.....	-77	1:56,000
Stephenville-Lampasas.....	-47	1:92,000

LAMPASAS BASE TO SEGUIN BASE.

The adjustment of the triangulation between the Lampasas base net and the Seguin base is completely discussed in Appendix 5 of the Report for 1905. This adjustment was made in one section holding the line May-Gabriel as fixed by the previous adjustment and the length of the Seguin base as measured.

The following are the statistics regarding the accuracy of the work:

Probable error of an observed direction.....	±0'45
Maximum correction to a direction.....	1'96
Number of triangles with plus closures.....	25
Number of triangles with minus closures.....	32
Average triangle closure.....	1'13
Maximum triangle closure.....	3'97
Mean error of an angle.....	±0'82

In solving the normal equations the length equation was assigned to the last place so that the discrepancy in length, after all the conditions relating to closures of triangles and ratio of lengths had been satisfied, became known. The length of the Seguin base, as thus computed from the Lampasas base, was 1 part in 620,000 less than its measured length, corresponding to a discrepancy of -7 in the seventh place of logarithms.

SEGUIN BASE NET TO ALICE BASE.

The adjustment, covering the data which are here reproduced from Appendix 5 of the Report for 1911, extended from the line Lavernia-Thomas, as fixed in the preceding adjustment, to the Alice base and to the Laguna Madre base. A spur, only two stations of which are included in this report, extends from the line Nolan-Elliff to the Laguna Madre base on the coast. Besides the lengths above mentioned the directions of the lines Lavernia-Thomas and Alice-Wood were held fixed, Alice being a Laplace station and the azimuth of the last-mentioned line being thus fixed.

The following are the statistics regarding the accuracy of the work:

Probable error of an observed direction.....	±0'36
Maximum correction to a direction.....	1'09
Number of triangles with plus closures ¹	27
Number of triangles with minus closures ¹	30
Average triangle closure.....	1'04
Maximum triangle closure.....	3'25
Mean error of an angle.....	±0'78

In the following table are given the discrepancies between bases. A plus sign before the discrepancy expressed in terms of logarithms means that the first base named is longer as measured than as computed through the intervening triangulation from the second base mentioned.

Bases.	Discrepancy in seventh place of log.	Discrepancy expressed as a ratio.
Seguin to Alice.....	-144	1:30,200
Alice to Laguna Madre.....	+ 78	1:59,500

At Alice the discrepancy in azimuth amounted to 1'22, the azimuth at Alice Laplace station being larger than the azimuth as carried through the triangulation.

¹ One triangle has a zero closure.

THE NORTH AMERICAN DATUM.

Concerning the actual use of the table of geographic positions, it is necessary to explain the "North American datum," which serves as the basis for all the geodetic values in this report.

Early in the year 1913 the Superintendent of the U. S. Coast and Geodetic Survey was notified by the director of the Comisión Geodésica Mexicana and by the chief astronomer of the Dominion of Canada Astronomical Observatory that the so-called United States standard datum had been adopted as the datum for the triangulation of those organizations. They also reported that the Clarke spheroid of 1866, now used in the United States, would be used by them.

Owing to the international character of the datum adopted by the three countries, the Superintendent of the U. S. Coast and Geodetic Survey changed its designation from the "United States standard datum" to the "North American datum."

EXPLANATION OF POSITIONS, LENGTHS, AND AZIMUTHS, AND OF THE NORTH AMERICAN DATUM.

All of the positions and azimuths have been computed upon the Clarke spheroid of 1866, as expressed in meters, which has been in use in the U. S. Coast and Geodetic Survey for many years.

After a spheroid has been adopted and all the angles and lengths in a triangulation have been fully fixed, it is still necessary, before the computation of latitudes, longitudes, and azimuths can be made, to adopt a standard latitude and longitude for a specified station and a standard azimuth of a line from that station. For convenience the adopted standard position (latitude and longitude) of a given station, together with the adopted standard azimuth of a line from that station, is called the geodetic datum.

The precise triangulation in the United States was commenced at various points and existed at first as a number of detached portions; in each of which the geodetic datum was necessarily dependent only upon the astronomic stations connected with that particular portion. As examples of such detached portions of triangulation there may be mentioned the early triangulation in New England and along the Atlantic coast, a detached portion of the transcontinental triangulation centering on St. Louis and another portion of the same triangulation in the Rocky Mountain region, and three separate portions of triangulation in California, namely, in the latitude of San Francisco, in the vicinity of Santa Barbara Channel, and in the vicinity of San Diego. With the lapse of time these separate pieces expanded until they touched.

The transcontinental triangulation, the office computation of which was completed in 1899, joined all the detached portions mentioned and made them one continuous triangulation. As soon as this took place the logical necessity existed of discarding the old geodetic data used in these various pieces and of substituting one for the whole country, or at least for as much of the country as is covered by continuous triangulation. To do this was a very tedious piece of work and involved much preliminary study to determine the best datum to be adopted. On March 13, 1901, the superintendent adopted what was known from that time until 1913 as the

United States standard datum, but it is now known as the North American datum, and it was decided to reduce the positions to that datum as rapidly as possible. The datum adopted was that formerly in use in New England, and therefore its adoption did not affect the positions which had been used for geographic purposes in New England and along the Atlantic coast to North Carolina, nor those in the States of New York, Pennsylvania, New Jersey, and Delaware. The adopted datum does not agree, however, with that used in the Transcontinental Triangulation and in the Eastern Oblique Arc of the United States, publications which deal primarily with the purely scientific problem of the determination of the figure of the earth and which were prepared for publication before the adoption of the new datum.

As the adoption of such a standard datum was a matter of considerable importance, it is in order here to explain the desirability of this step more fully.

The main objects to be attained by the geodetic operations of the U. S. Coast and Geodetic Survey are, first, the control of the charts published by the Survey; second, the furnishing of the geographic positions (latitudes and longitudes), of accurately determined elevations, and of distances and azimuths, to officers connected with the Survey and to other organizations; third, the determination of the figure of the earth. For the first and second objects it is not necessary that the reference spheroid should be accurately that which most closely fits the geoid within the area covered, nor that the adopted geodetic datum should be absolutely the best that can be derived from the astronomic observations at hand. It is simply desirable that the reference spheroid and the geodetic datum adopted shall be, if possible, such a close approximation to the truth that any correction which may hereafter be derived from the observations which are now, or may become, available shall not greatly exceed the probable errors of such corrections. It is, however, very desirable that one spheroid and one geodetic datum be used for the whole country. In fact, this is absolutely necessary if a geodetic survey is to perform fully the function of accurately coordinating all surveys within the area which it covers. This is the most important function of a geodetic survey. To perform this function, it is also highly desirable that when a certain spheroid and geodetic datum have been adopted for a country they be rigidly adhered to, without change for all time unless shown to be largely in error.

In striving to attain the third object, the determination of the figure of the earth, the conditions are decidedly different. This problem concerns itself primarily with astronomic observations of latitude, longitude, and azimuth and with the geodetic positions of the points at which the astronomic observations were made, but is not concerned with the geodetic positions of other points fixed by the triangulations. The geodetic positions (latitudes and longitudes) of comparatively few points are therefore concerned in this problem. However, in marked contrast to the statements made in preceding paragraphs, it is desirable in dealing with this problem that with each new important accession of data, a new spheroid fitting the geoid with the greatest possible accuracy, and new values of the geodetic latitudes, longitudes, and azimuths of the highest degree of accuracy, should be derived.

The North American datum was adopted with reference to positions furnished for geographic purposes but has no reference to the problem of the determination of the figure of the earth. It is adopted with reference to the engineer's problem of furnishing standard positions and does not affect the scientist's problem of the determination of the figure of the earth.

The principles which guided in the selection of the datum to be adopted were: First, that the adopted datum should not differ widely from the ideal datum for which the sum of the station errors in latitude, longitude, and azimuth should each be zero; second, it was desirable that the adopted datum should produce minimum changes in the publications of the U. S. Coast and Geodetic Survey, including its charts; and, third, it was desirable, other things being equal, to adopt that datum which allowed the maximum number of positions already in the office files to remain unchanged, and therefore necessitated a minimum amount of new computation. These considerations led to the adoption, as the standard, of that datum which had been in use for many years in the northeastern group of States and along the Atlantic coast as far south as North Carolina.

An examination of the station errors of the astronomical stations so far reduced, scattered widely over the United States from Maine to Louisiana and to California, indicated that this datum approaches closely the ideal for which the algebraic sum of the station errors of each class would be zero.

The North American datum, upon which the positions and azimuths given in this publication depend, may be defined in terms of the position of the station Meades Ranch as follows:

	°	'	"
$\phi=39$	13	28.686	
$\lambda=98$	32	30.506	
α to Waldo	=75	28	14.62

Points are then said to be upon the North American datum when they are connected with the station Meades Ranch by a continuous triangulation, through which the corresponding latitudes, longitudes, and azimuths have been computed on the Clarke spheroid of 1866, as expressed in meters, starting from the above data.

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 the 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, on the North American datum. His local triangulation, based on this control, will prevent the accumulation of excessive errors as he carries on his mapping operations. In the event that the available precise 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 precise or a primary triangulation station and connect his base to the station by triangulation, thus obtaining proper geographic positions for his local surveys.

Instructions for secondary (formerly called tertiary) triangulation, suitable for the control of local surveys, may be found in U. S. Coast and Geodetic Survey Special Publication No. 26, which can be had at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C.

(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 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 the modern "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 precise or primary control in considerable detail over the entire area affected, secondary triangulation or traverse then being used to furnish additional points for the survey. In such a control survey the triangulation should invariably be started from a line of adjusted triangulation on the North American datum.

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 precise or primary triangulation scheme. Tables for computing plane coordinates are found in U. S. Coast and Geodetic Survey Special Publication No. 71.

The U. S. 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 from them.

EXPLANATION OF TABLES.

ARRANGEMENT OF TABULATED DATA.

In the tables of positions the latitude and longitude of each point are given on the North American datum (see p. 7); also the length and azimuth of each line observed over, whether in one way or both ways, to other points of the triangulation. **NO LENGTHS OR AZIMUTHS ARE REPEATED, AND FOR A GIVEN LINE THE LENGTH AND AZIMUTH WILL BE FOUND OPPOSITE THE POSITION OF ONE OR THE OTHER OF THE TWO STATIONS INVOLVED.**

The distances between stations are given in both meters and feet. To facilitate further 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 of the length in meters which is derived first in the computation, the lengths in meters given in this table being derived from the corresponding logarithm and the lengths in feet in turn derived from the lengths in meters by the aid of the conversion tables on pages 64-71. Where further work of considerable extent is contemplated, an accumulation of error in the last two operations can be avoided by using the logarithm.

EXPLANATION OF LENGTHS.

The lengths as given in the tables are all reduced to sea level. If the actual length of the line simply reduced 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 a correction = (length of the line as given in meters) times

$$\left[\frac{\text{mean elevation of the two ends of the line in meters}}{6\,370\,000} \right].$$

The error introduced by the use of the above approximate formula will be within the probable error of the triangulation for any of the data given in this publication.

AZIMUTH AND BACK AZIMUTH.

Because of the convergence of the meridians the azimuth and 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 points. To illustrate from the tables, page 14, the azimuth from Burson to Wingard is 266° 49' 44".66, while the back azimuth or the azimuth from Wingard to Burson is 87° 06' 33".35.

The azimuths of the triangulation lines offer a very convenient and accurate means of testing the error 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.

ACCURACY OF DATA INDICATED IN TABLES.

The rule followed in recent publications of this office has been to give latitudes and longitudes 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 (observed from only two stations) or checked by vertical angles only.

In the columns giving azimuths, distances, and logarithms of distances, the accuracy is indicated to a certain extent by the number of decimal places given, it being understood that in each case two doubtful figures are given. 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 be cast on the third figure from the right.

HOW TO FIND THE DATA DESIRED.

Preceding the index at the back of this publication are 11 maps. The first is an index map showing all areas in the United States covered by published triangulation rigidly computed on the North American datum. Following that is an index map showing the triangulation stations in the area covered by this publication. The other 9 are detailed maps showing the scheme of triangulation plotted by latitudes and longitudes. From these can be obtained the names of all points in any portion of the area.

Having thus found the names of the points desired, the tables may then be conveniently consulted by using the index at the end of this publication. In the appropriately headed columns opposite the name of each station are given the pages on which may be found its geographic position, description, and elevation above sea level, and the number of the detailed sketch showing the scheme of observed lines from that station.

RELATED PUBLICATIONS.

Engineers and others using the data given in this report for the control of maps and surveys will find it of help to have Special Publications Nos. 5, 8, and 71 of the U. S. Coast and Geodetic Survey. They may be obtained at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Special Publication No. 5 is entitled "Tables for a polyconic projection of maps based on Clarke's reference spheroid of 1866." This publication contains the necessary explanation of the method employed in constructing a polyconic projection, and also gives the values in meters of the degrees, minutes, and seconds of latitude and longitude for all latitudes.

Special Publication No. 8 is entitled "Formulæ and tables for the computation of geodetic positions." As the title of this publication

implies, the data contained in it will enable one to compute the latitudes and longitudes for triangulation where the distances and angles are known.

Special Publication No. 71 is entitled "Relation between plane rectangular coordinates and geographic positions." This book contains tables which will facilitate the use by engineers of plane coordinates for local surveys.

The principal lists of geographic positions published on the North American datum throughout the United States, together with descriptions of stations, are contained in the following publications of the U. S. Coast and Geodetic Survey and of other organizations:

Appendix 8 of the Report for 1888, positions in Connecticut.

Appendix 8 of the Report for 1893, positions in Pennsylvania, Delaware, and Maryland.

Appendix 6 of the Report for 1901, positions and descriptions in Kansas and Nebraska.

Appendix 4 of the Report for 1903, positions and descriptions in Kansas, Oklahoma, and Texas. (Superseded by Special Publication No. 88.)

Appendix 9 of the Report for 1904, positions and descriptions in California.

Appendix 5 of the Report for 1905, positions and descriptions in Texas. (Superseded by Special Publication No. 88.)

Appendix 3 of the Report for 1907, positions and descriptions in California.

Appendix 5 of the Report for 1910, positions and descriptions in California.

Appendix 4 of the Report for 1911, positions and descriptions in Nebraska, Minnesota, North Dakota, and South Dakota.

Appendix 5 of the Report for 1911, positions and descriptions in Texas. (Superseded by Special Publication No. 88.)

Appendix 6 of the Report for 1911, positions and descriptions in Florida.

Special Publication No. 11, positions and descriptions in Texas, New Mexico, Arizona, and California.

Special Publication No. 13, positions and descriptions in California, Oregon, and Washington.

Special Publication No. 16, positions and descriptions in Florida.

Special Publication No. 17, positions and descriptions in Texas.

Special Publication No. 19, positions and descriptions in Colorado, Utah, Nevada, Wyoming, Montana, South Dakota, and North Dakota.

Special Publication No. 24, positions and descriptions in Alabama and Mississippi.

Special Publication No. 30, positions and descriptions in West Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri.

Special Publication No. 31, positions and descriptions in Oregon, Washington, and California.

Special Publication No. 43, positions in Georgia.

Special Publication No. 45, descriptions in Georgia.

Special Publication No. 46, positions and descriptions in Maine.

Special Publication No. 54, positions and descriptions in Texas.

Special Publication No. 62, positions and descriptions in Rhode Island.

Special Publication No. 70, positions and descriptions in Kansas.

Special Publication No. 74, positions and descriptions in Idaho, Oregon, and Washington.

Special Publication No. 76, positions and descriptions in Massachusetts.

Special Publication No. 78, positions and descriptions in Texas (Rio Grande arc).

Special Publication No. 79, positions and descriptions in Indiana.

Special Publication No. 84, positions and descriptions in California and Oregon.

Special Publication No. 86, positions and descriptions in Illinois and Wisconsin.

Special Publication No. 88, positions and descriptions in Oklahoma and Texas.

Report on triangulation of Greater New York.

Report on a plan of sewerage for the City of Cincinnati.

Appendix EEE, pages 2906-3031, Annual Report of the Chief of Engineers, U. S. Army, 1902, positions of points on and near the Great Lakes.

Professional Paper No. 24, Corps of Engineers, U. S. Army, descriptions of points on and near the Great Lakes.

Publications of the Massachusetts Commission on Waterways and Public Lands.

Various bulletins of the United States Geological Survey.

Geographic positions.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points.</i>	• • "	• • "	• • "				
Rutherford, 1901..	37 08 57.928 98 06 31.618						
Miller, 1902.....	37 02 20.963 97 55 43.908	127 28 17.95	307 21 47.30	Rutherford....	4.3040518	20139.64	66074.8
Fowler, 1902.....	37 07 35.852 97 48 50.372	46 29 33.16 95 36 23.39	226 25 23.81 275 25 42.68	Miller..... Rutherford....	4.1489378 4.4202009	14090.87 26314.85	46229.8 86334.6
Renfrow, 1902....	36 54 20.782 97 42 21.332	126 46 35.84 158 36 27.20	306 38 33.15 338 32 32.96	Miller..... Fowler.....	4.3937991 4.4204278	24702.76 26328.60	81242.5 86379.7
Sand Hill, 1902...	36 52 26.036 98 07 09.255	181 44 23.54 222 41 51.32 264 23 31.50	1 44 46.20 42 48 43.36 84 38 24.67	Rutherford.... Miller..... Renfrow.....	4.4855895 4.3975305 4.5688526	30590.70 24976.44 37012.85	100363.0 81943.5 121433.0
Vicar, 1902.....	36 40 28.107 97 53 44.786	138 01 58.10 213 22 32.57	317 53 56.49 33 29 21.88	Sand Hill..... Renfrow.....	4.4741454 4.4879376	29795.14 30756.55	97752.9 100907.1
Hahn, 1902.....	36 34 49.254 97 37 19.073	113 10 43.69 168 17 39.65	293 00 55.60 348 14 38.83	Vicar..... Renfrow.....	4.4252972 4.5668230	26625.47 36882.73	87353.7 121006.1
McCoy, 1902.....	36 32 21.047 98 03 29.151	171 39 04.05 224 00 02.80 263 11 47.86	351 36 52.49 44 05 51.27 83 27 23.09	Sand Hill..... Vicar..... Hahn.....	4.5745313 4.3199028 4.5945123	37543.20 20888.29 39310.84	123173.0 68531.0 128972.3
Enid, 1902.....	36 27 46.148 97 49 10.204	111 41 38.04 233 32 48.38	291 33 07.11 53 39 51.59	McCoy..... Hahn.....	4.3610240 4.3420325	22994.50 21980.24	75441.1 71213.5
Garber, 1902.....	36 26 28.959 97 34 46.205	96 32 37.18 166 12 33.04	276 24 03.84 346 11 02.09	Enid..... Hahn.....	4.3355317 4.2028734	21653.68 15943.12	71042.1 52306.7
Mitchell, 1902....	36 14 20.366 97 28 45.253	129 13 01.30 158 07 59.27	309 00 55.25 338 04 25.36	Enid..... Garber.....	4.5951338 4.3826832	39307.14 24136.99	129157.0 79189.4
Waukomis, 1902..	36 17 02.851 97 54 35.206	154 52 13.50 202 12 03.03 277 14 51.62	334 46 56.59 22 15 15.81 97 30 08.31	McCoy..... Enid..... Mitchell.....	4.4951545 4.3308231 4.5912408	31271.91 21420.18 39015.83	102597.9 70276.0 128004.4
Parnell, 1902.....	36 06 05.874 97 49 00.345	157 34 20.75 243 14 55.72	337 31 11.98 63 26 52.85	Waukomis..... Mitchell.....	4.3406492 4.5311952	21910.34 33977.80	71884.2 111475.5
Wingard, 1902....	35 56 47.428 97 29 20.129	120 18 54.91 181 32 13.62	300 07 20.80 1 32 34.17	Parnell..... Mitchell.....	4.5340000 4.5141457	34197.95 32465.02	112197.8 106512.3
Burson, 1902.....	35 55 33.417 97 57 58.853	187 17 06.07 214 37 52.29 266 49 44.66	7 19 06.05 34 43 08.92 87 06 33.35	Waukomis..... Parnell..... Wingard.....	4.6027922 4.3748028 4.6349023	40067.50 22702.97 43142.20	131454.8 77765.5 141542.4
Elchoff, 1902.....	35 41 47.180 97 51 17.045	158 27 04.91 229 53 55.14	338 23 10.16 50 08 46.23	Burson..... Wingard.....	4.4375046 4.6351807	27384.49 43169.87	89843.9 141633.1
Edmonds, 1902....	35 39 32.111 97 27 56.292	96 51 01.12 176 13 56.83	276 37 23.82 356 13 07.79	Elchoff..... Wingard.....	4.5500529 4.5048513	35485.66 31978.00	116422.5 104911.5
Caddo, 1902.....	35 36 33.333 97 59 30.932	183 45 31.38 232 01 26.38 263 15 13.92	3 46 25.20 52 08 13.91 83 33 37.76	Burson..... Elchoff..... Edmonds.....	4.5467077 4.1908204 4.6811402	35213.38 15733.32 47988.83	115529.2 51618.4 157443.4
Yukon, 1902.....	35 28 50.368 97 45 21.397	123 45 44.05 159 29 29.48 232 59 24.54	303 37 30.18 339 28 02.15 53 09 32.47	Caddo..... Elchoff..... Edmonds.....	4.4102044 4.4076530 4.5174653	25719.61 25656.42 32920.42	84281.8 83875.9 108006.4
Smith, 1902.....	35 22 51.003 97 29 40.448	115 05 23.02 184 51 13.11	294 56 17.53 4 52 13.62	Yukon..... Edmonds.....	4.4181873 4.4908601	26191.92 30964.01	85931.3 101588.4
Carson, 1902.....	35 16 24.848 97 57 32.769	175 26 02.34 218 43 23.21 254 07 50.45	355 24 53.81 38 50 26.64 74 23 57.46	Caddo..... Yukon..... Smith.....	4.5724358 4.4694283 4.6422870	37362.49 29473.14 43882.06	122580.1 96896.5 143099.7
Elreno east base, 1900.	35 26 40.226 97 56 24.414	165 35 49.06 195 25 20.86 256 27 21.20 5 12 15.80	345 34 00.67 15 28 25.32 76 33 45.86 185 11 36.25	Caddo..... Elchoff..... Yukon..... Carson.....	4.2758453 4.4623348 4.2353330 4.2797350	18873.19 28969.12 17192.26 19042.98	61919.8 51541.3 66404.9 62476.8

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Elreno west base, 1900.	35 29 04.043	208 03 55.12	28 06 45.68	Caddo.....	4.1957688	15695.20	51493.3
	98 04 24.320	290 04 41.47	110 09 19.91	Elreno east base.	4.1101407	12886.671	42279.02
		336 01 32.86	156 05 30.95	Carson.....	4.4082285	25599.32	83987.1
Lanier, 1902.....	35 04 02.998	129 59 00.06	309 48 37.63	Carson.....	4.5519688	35642.55	116987.3
	97 39 32.174	203 14 35.29	23 20 17.59	Smith.....	4.5780191	37845.92	124160.2
Purcell, 1902.....	35 00 37.551	108 11 59.26	288 04 41.51	Lanier.....	4.3082905	20336.05	66719.2
	97 26 49.721	174 00 49.22	353 59 10.82	Smith.....	4.6101532	41319.32	135561.8
Table Hill, 1902...	34 40 17.963	161 11 13.36	341 05 35.71	Lanier.....	4.6605573	46404.20	152244.4
		186 36 48.61	6 38 26.80	Purcell.....	4.5778892	37834.61	124129.0
Osaria or Marlow (U.S.G.S.), 1902.	34 41 40.428	208 19 42.44	28 28 06.15	Lanier.....	4.6723878	47031.39	154302.2
	97 54 12.978	273 45 53.53	93 59 50.81	Table Hill....	4.5745146	37541.76	123168.3
Kechi, 1902.....	34 56 02.392	202 59 33.80	23 05 37.65	Carson.....	4.6121296	40938.28	134311.7
	98 08 05.471	251 01 23.53	71 18 46.26	Lanier.....	4.0618224	45901.03	150593.6
		321 23 37.87	141 31 33.16	Osaria.....	4.5309486	33958.51	111412.2
Arbuckle or Velma (U. S. G. S.), 1902.	34 26 01.913	145 20 32.73	325 13 06.76	Osaria.....	4.5463401	35183.59	115431.5
	97 41 06.887	213 27 57.15	33 34 25.83	Table Hill....	4.5002300	31639.96	103805.4
Arbuckle Mountain or Mounds (U.S.G.S.), 1902.	34 26 08.247	89 47 01.77	269 34 14.39	Arbuckle.....	4.5396857	34648.60	113676.8
	97 18 29.818	146 51 48.46	326 45 27.45	Table Hill....	4.4953621	31280.87	102647.0
Lone tree, 1902....	34 14 08.226	150 21 19.38	330 16 42.80	Arbuckle.....	4.4033264	25311.99	83044.4
	97 32 56.528	224 53 30.74	45 01 39.60	Arbuckle Mountain.	4.4962828	31353.27	102864.9
Monument, 1902..	34 14 23.204	224 24 13.41	44 31 50.75	Arbuckle.....	4.4795474	30168.06	98976.4
	97 54 53.654	270 40 53.26	90 53 14.31	Lone tree.....	4.5277605	33710.13	110597.3
Duncan, 1902.....	34 28 30.488	208 13 15.86	28 18 07.30	Osaria.....	4.4414650	27635.39	90667.1
	98 02 46.412	277 45 20.91	97 57 86.12	Arbuckle.....	4.5248567	33465.49	109860.3
		335 07 48.17	155 12 14.97	Monument....	4.4589942	28706.97	94379.6
Benton, 1902.....	34 05 35.068	171 08 39.01	351 07 43.37	Monument....	4.2105789	18469.44	54033.5
	97 53 14.577	243 01 45.63	63 13 09.65	Lone tree.....	4.5437737	34977.29	114754.7
Grady, 1902.....	34 02 51.813	106 07 43.87	286 01 22.53	Benton.....	4.2502381	18165.08	59596.4
	97 41 53.865	213 24 17.55	33 29 19.13	Lone tree.....	4.3975527	24977.71	81947.7
Blue, 1902.....	33 48 00.402	155 20 11.15	335 14 46.00	Benton.....	4.5535164	35789.79	117854.7
	97 43 32.815	185 15 10.57	5 16 05.51	Grady.....	4.4406096	27580.97	90488.6
Cube, 1902.....	33 55 37.314	208 35 35.42	28 42 29.71	Monument....	4.5909291	39530.21	129692.0
	98 07 12.930	229 22 00.48	49 29 49.40	Benton.....	4.4520790	28319.07	92910.1
		290 58 21.89	111 11 33.48	Blue.....	4.5928657	39135.04	128395.5
Myers, 1902.....	33 37 36.423	199 27 15.03	19 31 29.70	Cube.....	4.5480950	35326.04	115898.8
	98 14 50.995	248 10 54.37	68 28 17.12	Blue.....	4.7164528	52053.84	170780.0
Queen, 1902.....	33 37 30.133	90 25 11.66	270 12 33.37	Myers.....	4.5477147	35295.12	115797.4
	97 52 01.658	145 04 41.19	324 56 14.58	Cube.....	4.6115834	40886.83	134142.9
		213 59 45.54	34 04 28.24	Blue.....	4.3698156	23432.34	76877.6
Jones, 1902.....	33 31 21.306	126 53 40.33	306 48 09.65	Myers.....	4.2849037	19270.97	63224.8
	98 04 53.052	240 12 26.53	60 19 33.12	Queen.....	4.3600444	22911.02	75167.2
Bowie northwest base, 1900.	33 37 21.756	32 55 18.73	212 52 44.69	Jones.....	4.1214388	13226.31	43393.3
	98 00 14.492	91 12 47.47	271 04 42.11	Myers.....	4.8540440	22596.55	74135.8
		268 47 53.98	88 52 26.88	Queen.....	4.1039988	12705.70	41685.3
Bowie southeast base, 1900.	33 23 49.687	89 22 46.49	249 18 26.28	Jones.....	4.1134406	12984.96	42601.5
	97 57 02.107	142 46 06.24	822 44 19.80	Bowie northwest base.	3.9136034	8196.028	26889.80
		228 46 28.62	48 49 14.86	Queen.....	4.0126848	10296.37	33780.7

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Spradling, 1902...	33 23 53.748	160 16 11.91	340 14 26.24	Jones.....	4.1658298	14049.74	48003.4
	98 01 41.405	185 08 32.56	5 09 20.55	Bowie north-west base.	4.3978412	24994.31	82002.2
		210 42 14.54	30 47 34.62	Queen.....	4.4663583	29265.66	96015.8
Indian, 1902.....	33 19 29.978	187 06 26.54	7 07 55.86	Myers.....	4.5293882	33731.54	110907.6
	98 17 32.919	221 47 45.66	41 54 44.22	Jones.....	4.4689664	29421.61	96527.4
		251 38 50.18	71 47 33.44	Spradling.....	4.4134218	25907.28	84997.5
Bowie standpipe (U. S. G. S.), 1902.	33 33 57.636	41 27 24.97	221 21 34.37	Spradling.....	4.3945519	24805.73	81383.5
	97 51 05.911	77 20 42.56	257 13 05.48	Jones.....	4.3399751	21870.36	71772.7
		88 33 29.78	268 30 12.82	Bowie south-east base.	3.9633351	9190.42	30182.2
		114 00 43.03	293 55 39.49	Bowie north-west base.	4.1897652	15470.79	50786.6
		167 37 16.52	347 36 45.07	Queen.....	3.8202522	6702.74	21990.6
Jim Ned (U. S. G. S.), 1902.	33 38 45.999	75 49 08.9	255 41 50.4	Bowie standpipe.	4.3239626	21084.5	69175
	97 37 53.265	93 87 24.5	273 29 34.8	Queen.....	4.3406170	21908.7	71879
		157 14 24.3	337 11 10.2	Blue.....	4.3528919	22536.8	73939
Moore, 1902.....	33 11 07.733	132 37 03.09	312 31 06.22	Indian.....	4.3563217	22872.93	75042.3
	98 06 42.139	198 13 32.96	18 16 18.04	Spradling.....	4.3933020	24848.01	81524.1
Davis, 1902.....	33 03 49.932	143 29 22.40	323 25 51.72	Moore.....	4.2249617	16786.56	55078.9
	98 00 10.601	178 37 05.13	356 36 18.00	Spradling.....	4.5699692	37150.89	121885.9
Woolly, 1902.....	33 03 48.491	183 27 18.75	3 27 55.82	Indian.....	4.4032534	29057.17	95331.7
	98 18 40.628	233 56 49.78	54 03 22.41	Moore.....	4.3621436	23022.03	75531.4
		269 49 39.06	89 59 41.38	Davis.....	4.4569691	28939.74	93902.2
Gilbert, 1902.....	32 48 11.037	126 37 27.35	306 23 50.96	Woolly.....	4.6860771	48537.47	159243.3
	97 53 38.984	160 22 33.63	340 18 57.46	Davis.....	4.4873140	30712.42	100762.3
Kyle, 1902.....	32 49 18.014	181 44 59.72	1 45 16.89	Woolly.....	4.4285895	20828.07	88018.4
	98 19 12.209	227 35 43.87	47 46 01.21	Davis.....	4.8009243	39895.53	130890.6
		272 50 44.59	93 04 35.43	Gilbert.....	4.6014030	39939.53	131034.9
Oaks, 1902.....	32 41 33.621	126 57 30.96	306 50 54.97	Kyle.....	4.3770098	23823.73	78101.7
	98 07 00.358	239 32 06.37	59 39 19.87	Gilbert.....	4.3836206	24189.15	79360.6
Comanche, 1902...	32 22 35.642	139 56 56.13	310 46 48.61	Oaks.....	4.6601967	45729.53	150001.0
	97 48 10.756	169 44 46.33	349 41 49.54	Gilbert.....	4.6810010	47973.46	157392.9
McClenny, 1902...	32 27 09.028	183 48 20.05	343 44 13.50	Kyle.....	4.6297878	42637.12	139885.3
	98 11 35.060	195 02 16.75	15 04 44.64	Oaks.....	4.4405912	27579.80	90484.7
		282 41 00.18	102 53 32.95	Comanche.....	4.5755043	37627.41	123449.3
Pilot, 1902.....	32 15 38.086	166 32 41.79	346 30 57.45	McClenny.....	4.3401413	21884.73	71800.2
	98 08 20.098	247 35 26.18	67 49 12.73	Comanche.....	4.5338098	34182.87	112148.3
Lone Mountain, 1902.	32 00 51.011	130 12 05.58	310 07 47.76	Pilot.....	4.2194409	16574.52	54378.2
	98 00 10.443	151 00 34.24	330 54 31.54	McClenny.....	4.5631402	36571.29	119984.3
		218 43 07.09	38 49 34.55	Comanche.....	4.4818405	30327.77	99500.4
Young, 1902.....	32 11 27.552	243 50 35.16	03 55 55.79	Pilot.....	4.2439616	17533.22	57522.6
	98 18 21.365	275 53 32.59	96 03 10.36	Lone Mountain.	4.4590293	28577.84	93759.1
Gatlin, 1902.....	32 10 50.528	203 14 28.33	23 18 27.20	McClenny.....	4.1873672	14701.69	48238.8
	98 15 17.171	305 28 29.18	125 30 12.02	Pilot.....	4.1270828	13399.32	43960.9
		17 17 56.36	197 16 18.03	Young.....	4.2101966	16225.52	53233.2
Stephenville, north base, 1900.	32 11 41.730	88 39 16.06	268 33 12.16	Young.....	4.2834909	17925.90	58811.9
	98 06 57.203	163 24 19.23	343 23 35.02	Pilot.....	3.8968357	7596.89	24924.1
		287 57 50.33	108 01 29.75	Lone Mountain.	4.0429200	11038.91	36216.8

¹ Computed. Line observed by U. S. Geological Survey, but not by U. S. Coast and Geodetic Survey.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Alarm, 1902.....	32 11 02.124	96 10 14.92	276 07 47.12	Young.....	3.8639401	7310.38	23984.1
	98 13 43.897	171 28 33.18	351 27 43.39	Gatlin.....	4.2163779	16458.03	53996.1
		224 54 13.20	44 57 05.85	Pilot.....	4.0793946	12005.90	39389.4
		263 26 13.90	83 29 50.64	Stephenville north base.	4.0303058	10722.74	35179.5
		275 51 06.67	95 58 16.63	Lone Mountain.	4.3277173	21267.54	69775.3
Stephenville south base, 1900.	32 08 18.865	108 05 24.84	287 59 21.89	Young.....	4.2738679	18787.45	61638.5
	98 06 59.579	115 26 58.91	295 23 21.68	Alarm.....	4.0692581	11729.73	38483.3
		180 34 10.72	0 34 11.98	Stephenville north base.	3.7962336	6255.09	20521.9
		254 54 02.78	74 57 37.31	Lone Mountain.	4.0390405	10940.58	35894.2
Gibson, 1902.....	31 56 36.636	160 28 58.61	340 25 41.43	Young.....	4.4641773	29119.05	95534.7
	98 12 09.973	189 42 38.72	9 44 40.89	Pilot.....	4.5523168	35871.12	117031.0
		196 22 27.65	16 25 13.72	Stephenville north base.	4.4632951	29059.97	95340.9
		200 36 52.70	20 39 37.38	Stephenville south base.	4.3637240	23105.96	75806.8
		217 21 50.90	37 28 09.59	Lone Mountain.	4.4886418	30806.46	101070.9
Gleason, 1902.....	31 52 21.238	107 55 11.61	287 47 00.26	Gibson.....	4.4092668	25660.60	84188.2
	97 58 40.370	130 03 39.59	315 52 09.55	Young.....	4.6911884	49112.09	161128.6
		151 11 07.22	331 05 39.04	Stephenville south base.	4.5272837	33071.00	110470.9
		170 04 08.27	350 02 13.71	Lone Mountain.	4.5102376	32827.48	107701.5
Chamliiss, 1902.....	31 39 23.304	166 57 33.37	346 55 05.47	Gibson.....	4.5141474	32009.87	107184.4
	98 07 20.303	215 25 59.11	35 31 40.73	Gleason.....	4.4086645	29421.48	96527.0
Scoggins, 1902.....	31 40 56.399	83 01 07.41	262 53 25.33	Chamliiss.....	4.3684933	23361.10	76043.9
	97 52 49.174	133 34 16.98	313 24 05.07	Gibson.....	4.0240828	42080.08	138059.7
		103 55 45.48	343 53 43.73	Gleason.....	4.3414857	21052.50	72022.8
Brown, 1902.....	31 26 18.791	178 51 16.33	358 51 06.73	Chamliiss.....	4.3832522	24108.64	79293.3
	98 07 10.904	219 59 48.99	40 07 20.05	Scoggins.....	4.5479579	35314.89	115832.3
King, 1902.....	31 23 35.221	103 15 12.11	283 08 08.08	Brown.....	4.3437978	22069.77	72407.2
	97 53 37.479	143 08 02.02	323 00 47.09	Chamliiss.....	4.5626350	36528.77	119844.7
		182 16 19.61	2 16 44.88	Scoggins.....	4.5063980	32062.09	106288.8
Franklin, 1902.....	31 14 48.747	163 13 19.52	343 11 13.30	Brown.....	4.3403267	22198.66	72830.1
	98 03 09.307	222 54 28.37	42 59 25.10	King.....	4.3464065	22151.67	72675.9
Gilmore, 1902.....	31 06 56.398	142 07 14.30	322 03 32.79	Franklin.....	4.2657062	18437.68	60491.0
	97 56 00.478	187 00 06.75	7 01 20.94	King.....	4.4912613	30992.83	101682.3
Flat Top, 1902.....	31 08 30.455	200 42 45.65	20 46 48.33	Brown.....	4.5426832	34886.97	114458.3
	98 14 58.214	238 46 12.06	58 52 20.36	Franklin.....	4.3417023	21908.09	72073.6
		275 55 44.20	96 05 32.39	Gilmore.....	4.4815741	30309.18	99439.4
Bachelor, 1902.....	30 59 39.956	138 55 44.49	318 51 02.24	Flat Top.....	4.3434367	22051.43	72347.1
	98 05 51.294	188 45 35.59	8 46 59.83	Franklin.....	4.4520763	28318.89	92209.6
		220 19 39.61	49 24 44.39	Gilmore.....	4.8147295	20640.94	67719.5
Lampasas north-east base, 1900.	31 03 41.385	130 23 47.82	310 20 17.33	Flat Top.....	4.1514540	14172.75	46498.4
	98 08 10.745	252 42 34.16	72 48 51.24	Gilmore.....	4.3007684	20266.02	66489.4
		333 82 32.90	153 33 44.78	Bachelor.....	3.9192969	8304.18	27244.6
Lampasas south-west base, 1900.	31 01 02.894	152 19 30.38	332 17 06.63	Flat Top.....	4.2008511	15880.02	52099.7
	98 10 19.781	204 10 12.35	24 13 55.42	Franklin.....	4.4453635	27884.54	91484.5
		215 01 19.18	35 02 25.71	Lampasas north-east base.	3.7763315	5961.171	19557.61
		244 23 43.87	64 31 07.29	Gilmore.....	4.4022405	25248.79	82837.1
	289 42 24.78	109 44 43.08	Bachelor.....	3.8788904	7566.42	24824.2	

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
May, 1902.....	30 51 55.386	176 40 37.99	356 40 03.08	Flat Top.....	4.4909911	30973.56	101619.1
	98 13 50.442	198 20 02.44	18 21 50.76	Lampasas southwest base.	4.2495353	17763.78	58280.0
		221 36 27.68	41 40 33.96	Bachelor.....	4.2820387	19144.20	62809.1
Gabriel, 1902.....	30 45 41.644	110 01 45.28	289 51 34.05	May.....	4.5281595	33741.12	110899.0
	97 53 57.202	143 44 38.56	323 38 32.08	Bachelor.....	4.5058325	32035.58	105103.4
		175 14 36.70	355 13 33.31	Gilmore.....	4.5954202	39398.10	129242.2
<i>Supplementary points.</i>							
Miller eccentric, 1902.	37 02 19.452	306 31 37.4	126 39 40.6	Renfrow.....	4.303005	24751.7	81206
	97 55 44.752	42 50 58.4	222 44 00.9	Sand Hill.....	4.390089	24928.1	81785
		170 20 43.3	350 19 09.6	Quarry.....	4.357790	22792.7	74779
		204 06 08.4	24 06 08.9	Miller.....	1.708013	51.052	167.49
Section 13, northwest corner, T. 29, R. 7 W., 1902.	36 59 54.905	53 07 32.0	233 00 05.1	Sand Hill.....	4.362214	23025.8	75544
	97 54 45.539	161 49 11.7	341 48 36.0	Miller eccentric	3.671186	4690.1	15387
		299 09 34.1	119 17 01.4	Renfrow.....	4.324237	21097.8	69218
Boundary stone 160, 1902.	36 59 54.982	89 52 36.9	269 52 10.7	Section corner 13.	3.032209	1077.2	3534
	97 54 01.975	150 18 16.3	330 17 14.4	Miller eccentric	3.709884	5127.2	16821
		150 45 43.4	330 44 41.8	Miller.....	3.712448	5157.6	16921
		300 39 51.4	120 46 52.5	Renfrow.....	4.304601	20165.1	66158
Red barn, near section 13, south gable, 1902.	37 01 00.800	1 36 22.9	181 36 21.5	Boundary stone 160.	3.307434	2029.7	6659
	97 53 59.674	29 10 33.5	209 10 05.9	Section corner 13.	3.366083	2326.4	7633
		133 02 24.1	313 01 20.8	Miller eccentric	3.550104	3553.1	11657
Livingood's, house, chimney, 1902.	37 00 10.546	200 16 56.1	20 17 31.9	Miller eccentric	3.627011	4236.5	13899
	97 56 44.176	279 19 27.7	99 20 39.1	Section corner 13.	3.473158	2972.7	9758
First auxiliary, 1902.	36 59 54.827	182 07 10.7	2 07 11.1	Livingood's house.	2.685035	484.9	1591
	97 56 44.901	198 26 21.0	18 26 57.2	Miller eccentric	3.672069	4699.7	15419
		269 56 37.3	89 57 49.1	Section corner 13.	3.470028	2951.4	9683
Second auxiliary, 1902.	37 00 02.287	252 09 14.9	72 09 34.1	Livingood's house.	2.919534	830.9	2726
	97 57 16.163	286 33 53.0	106 34 11.8	First auxiliary	2.906590	806.5	2646
Boundary stone 163, 1902.	36 59 54.728	181 45 40.9	1 45 41.1	Second auxiliary.	2.367604	233.1	765
	97 57 16.453	238 34 23.2	58 34 42.6	Livingood's house.	2.970930	935.3	3069
		269 46 20.7	89 46 39.7	First auxiliary	2.892193	780.2	2560
Camchester schoolhouse, belfry, 1902. ¹	37 00 04.00	245 54 13	65 58 04	Miller.....	4.015121	10354.3	33971
	98 02 06.38	27 59 24	207 56 22	Sand Hill.....	4.203075	15983.6	52440
Manchester schoolhouse, belfry, 1902. ¹	36 59 37.14	241 01 14	61 04 56	Miller.....	4.018430	10433.5	34221
	98 01 53.23	30 30 13	210 27 03	Sand Hill.....	4.188080	15419.8	50590
Sand Hill auxiliary, 1902.	36 52 08.978	208 25 47.3	28 25 54.2	Sand Hill.....	2.776657	597.9	1962
Quarter section corner, sections 25 and 36, stone, 1902.	36 52 09.134	89 13 34.4	269 13 25.8	Sand Hill auxiliary.	2.550182	354.962	1164.57
	98 07 06.419	172 19 20.0	352 19 18.3	Sand Hill.....	2.720768	525.7	1725

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.			
					Log (meters).	Meters.	Feet.	
<i>Supplementary points—Con.</i>								
Sand Hill reference mark, 1902.	36 52 08.785	90 58 04.9	270 57 56.4	Sand Hill auxiliary.	2.546570	352.0	1155	
	98 07 06.638	172 47 20.4	352 47 18.8		Sand Hill.....	2.729106	536.0	1759
		195 23 43.5	15 23 43.5		Quarter section corner 25 and 36.	1.040942	11.14	36.5
Wakita low elevator, east gable, 1902. ¹	36 53 06.65	85 59 13	265 52 07	Sand Hill.....	4.240221	17028.7	57837	
	97 55 19.22	177 57 16	357 57 01		Miller.....	4.232955	17098.4	56097
Wakita high elevator, east gable, 1902. ¹	36 53 06.11	86 03 52	265 56 43	Sand Hill.....	4.248705	17729.9	58169	
	97 55 15.08	177 36 52	357 36 34		Miller.....	4.233478	17119.0	56165
Wakita church, white spire, 1902. ¹	36 52 59.30	86 41 18	266 34 10	Sand Hill.....	4.241510	17438.5	57213	
	97 55 20.33	178 33 44	358 33 33		Miller.....	4.238538	17319.6	56823
Renfrow Christian Church, center, spire, 1902. ¹	36 55 35.09	63 30 39	243 28 47	Renfrow.....	3.710354	5132.8	16840	
	97 39 15.77	117 11 36	297 01 42		Miller.....	4.438020	27454.9	90075
Renfrow low elevator, east gable, 1902. ¹	36 55 26.19	82 31 13	262 14 26	Sand Hill.....	4.622033	41882.5	137410	
	97 39 12.57	117 37 29	297 27 82		Miller.....	4.441720	27051.0	90720
Renfrow high elevator, east gable, 1902. ¹	36 55 23.90	82 30 33	262 19 47	Sand Hill.....	4.621557	41886.7	137259	
	97 39 14.07	117 47 22	297 37 26		Miller.....	4.441720	27051.0	90720
Section 14, southeast corner T. 28 N., R. 5 W., 1902. ¹	36 53 51.82	135 13 51	315 13 30	Renfrow.....	3.099577	1257.7	4120	
Medford schoolhouse, cupola, 1902. ¹	36 48 34.50	145 57 30	325 50 32	Miller.....	4.488074	30766.2	100939	
	97 44-07.01	193 46 16	13 47 19		Renfrow.....	4.041019	10990.5	36058
Medford mill, center of tower, 1902. ¹	36 48 11.21	192 40 20	12 41 22	Renfrow.....	4.067332	11677.0	38310	
	97 44 04.80	337 47 51	157 51 53		Hahn.....	4.426406	26693.5	87577
Numa elevator, center shaft, 1902. ¹	36 48 12.35	3 30 54	183 30 18	Hahn.....	4.364483	24801.8	81371	
	97 36 17.91	141 37 32	321 33 54		Renfrow.....	4.161152	14492.8	47548
Antioch Church, center spire, 1902. ¹	36 46 01.10	16 51 40	196 49 09	Hahn.....	4.335204	21637.3	70988	
	97 23 06.63	138 18 07	318 12 35		Renfrow.....	4.314791	20643.9	67729
Pond Creek schoolhouse, dome, 1902. ¹	36 40 15.641	57 51 07.3	237 41 50.5	McCoy.....	4.438283	27433.6	90005	
	97 47 55.866	128 17 27.3	308 05 56.5	Sand Hill.....	4.561234	36411.1	119459	
		302 25 04.9	122 31 24.5	Hahn.....	4.272756	18739.4	61481	
Pond Creek roller mill, east cupola, 1902. ¹	36 40 11.85	801 32 37	121 39 04	Hahn.....	4.277632	18951.0	62175	
	97 48 08.71	57 42 43	237 33 84		McCoy.....	4.482700	27083.2	88355
Pond Creek standpipe, 1902.	36 40 08.637	58 17 26.7	238 08 08.7	McCoy.....	4.437146	27361.9	89770	
	97 47 53.353	98 57 47.7	273 54 17.8	Vicar.....	3.941879	8747.4	28899	
		128 30 29.2	308 18 57.2	Sand Hill.....	4.563296	36584.4	120027	
		197 22 25.0	17 25 43.8	Renfrow.....	4.439766	27527.4	90313	
		801 56 21.3	122 02 39.9	Hahn.....	4.269094	18582.1	60965	
Pond Creek astronomical station, 1906.	36 40 07.57	126 47 25.4	306 47 24.4	Pond Creek water tower.	1.788813	54.80	179.8	
	97 47 51.59	159 19 03.4	339 19 01.2	Pond Creek high school, spire.	2.424397	265.70	871.7	

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Township corner, T _s . 25 and 26, N., R _s . 6 and 7 W., cedar post, 1902. ¹	36 40 49.68	18 19 13	198 19 08	Vicar.....	2.845377	700.4	2298
	97 53 35.92	136 51 03	316 42 56	Sand Hill.....	4.469147	29454.3	96835
Friends' College Church, spire, 1902.	36 39 20.718	144 38 45.0	324 31 54.9	Sand Hill.....	4.467218	29323.6	96206
	97 55 44.165	239 09 57.6	59 11 08.7	Vicar.....	3.538107	8452.3	11326
		287 26 32.1	107 37 31.2	Hahn.....	4.459364	28798.1	94482
Kremlin elevator, east gable, 1902.	36 32 47.614	351 56 06.0	171 56 37.5	Enid.....	3.972435	9385.0	30791
	97 50 03.085	87 43 40.0	267 35 40.1	McCoy.....	4.302465	20066.2	65834
		158 48 16.6	338 46 04.6	Vicar.....	4.182592	15226.2	49955
Kremlin schoolhouse, belfry, 1902. ¹	36 32 45.28	353 25 32	173 25 57	Enid.....	3.967618	9281.5	30451
	97 49 52.88	158 01 19	337 59 01	Vicar.....	4.187137	15386.4	50480
Hunter elevator, center, 1902. ¹	36 33 46.10	242 22 41	62 24 10	Hahn.....	3.623311	4200.6	13781
	97 39 48.78	51 35 22	231 29 48	Enid.....	4.251389	17839.8	58529
Section 3, southwest corner T. 24 N., R. 4 W., stone, 1902. ¹	36 34 41.44	181 45 21	1 45 21	Hahn.....	2.381873	240.92	790.4
Garber elevator, center shaft, 1902.	36 26 25.386	166 33 00.5	346 31 31.6	Hahn.....	4.203304	15970.0	52395
	97 34 49.693	240 36 53.4	60 36 55.4	Garber.....	1.994908	98.8	324
		337 50 25.5	157 54 01.4	Mitchell.....	4.382456	24124.4	79148
Garber Church, whitespire, 1902.	36 26 12.731	336 48 58.6	156 52 41.7	Mitchell.....	4.378045	23880.6	78348
	97 35 01.748	97 49 49.1	277 41 25.0	Enid.....	4.328877	21324.4	69962
		167 53 50.7	347 52 29.0	Hahn.....	4.211756	16283.8	53424
Center section 25, T. 23, R. 4 W., post, 1902. ¹	36 26 26.66	92 37 11	272 37 06	Garber.....	2.303908	201.33	660.5
Cropper east elevator, north gable, 1902.	36 20 26.927	101 52 17.5	281 47 39.4	Enid.....	4.075847	11908.2	39069
	97 41 22.170	201 19 10.4	21 21 35.0	Hahn.....	4.220718	16623.3	54538
		269 57 42.1	90 01 37.2	Garber.....	3.993960	9861.9	32355
Breckenridge M. E. Church, spire, 1902.	36 26 17.264	108 43 17.8	288 40 04.7	Enid.....	3.931847	8547.7	28044
	97 43 45.073	211 17 39.9	81 21 29.6	Hahn.....	4.266579	18474.8	60613
		268 40 47.7	88 46 07.8	Garber.....	4.127900	13424.6	44044
		43 32 32.7	223 26 07.2	Waukomis.....	4.372066	23554.1	77277
Breckenridge highest elevator, east gable, 1902. ¹	36 26 15.61	42 40 15	222 34 02	Waukomis.....	4.364604	23152.8	75960
	97 44 09.45	110 16 36	290 13 36	Enid.....	3.906484	8062.8	26453
North Enid Congregational Church, spire, 1902. ¹	36 26 28.84	234 44 46	54 46 06	Enid.....	3.615913	4129.6	13549
	97 51 25.64	15 10 40	195 08 48	Waukomis.....	4.257069	18074.6	59300
Enid schoolhouse, cupola, 1902. ¹	36 24 31.74	220 28 43	40 30 45	Enid.....	3.896523	7879.9	25853
	97 52 35.65	12 10 32	192 09 21	Waukomis.....	4.150876	14153.9	46437
Enid Catholic Church, spire, 1902. ¹	36 23 48.81	218 49 40	38 52 00	Enid.....	3.972806	9393.0	30817
	97 53 06.73	10 00 51	189 59 58	Waukomis.....	4.104015	12706.2	41687
Enid ice plant, stack, 1902.	36 23 19.827	212 11 15.1	32 13 18.3	Enid.....	3.988841	9701.5	31829
	97 52 37.760	12 56 21.4	192 55 17.0	Quarter section corner.	4.084412	12145.4	39847
		14 09 53.4	194 08 43.8	Waukomis.....	4.078578	11983.3	39315
Enid Big Four elevator, east gable, 1902. ¹	36 23 14.08	212 16 10	32 18 16	Enid.....	3.996496	9919.6	32545
	97 52 42.91	13 46 10	193 45 04	Waukomis.....	4.071168	11780.6	38650

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Waukomis schoolhouse, belfry, 1902.	36 16 39.944	339 24 44.4	159 27 37.7	Parnell.....	4.319592	20873.3	69482
	97 53 53.777	124 17 48.5	304 17 22.2	Waukomis.....	3.098048	1253.3	4112
		270 23 35.4	96 38 27.0	Mitchell.....	4.578984	37903.9	124356
Quarter section corner, sections 23 and 24, 1902.	36 10 55.783	135 39 09.7	315 39 04.0	Waukomis.....	2.483850	304.7	1000
	97 54 28.732	300 41 34.3	120 41 53.8	Waukomis schoolhouse.	2.980664	956.5	3138
Bison highest elevator, center shaft, 1902.	36 11 43.796	13 13 45.7	193 11 00.6	Burson.....	4.487436	30721.0	100790
	97 53 18.413	168 57 52.1	348 57 06.8	Waukomis.....	4.000847	10019.5	32872
		328 12 15.0	148 14 47.3	Parnell.....	4.088193	12251.0	40195
Bison low elevator, center, 1902. ¹	36 11 49.15	168 41 16	348 40 30	Waukomis.....	3.993910	9860.8	32352
	97 53 17.76	328 40 16	148 42 48	Parnell.....	4.092850	12383.7	40029
Hennessey roller mill, stack, 1902. ¹	36 08 49.59	177 42 18	357 42 00	Waukomis.....	4.270858	18917.3	62065
	97 54 04.91	280 00 20	100 03 20	Parnell.....	3.898518	7730.0	25381
Hennessey windmill at railroad, 1902.	36 06 29.607	16 18 56.2	196 16 36.3	Burson.....	4.323623	21068.0	69121
	97 54 02.771	177 37 16.8	357 36 57.0	Waukomis.....	4.290878	19537.9	64101
		275 28 32.4	95 31 30.6	Parnell.....	3.880780	7599.5	24933
Hennessey schoolhouse, dome, 1902.	36 06 14.458	17 10 23.2	197 13 59.1	Burson.....	4.315730	20688.5	67876
	97 53 53.810	177 02 13.4	357 01 49.0	Waukomis.....	4.301285	20011.7	65655
		272 02 23.1	92 05 16.0	Parnell.....	3.896022	7345.5	24099
Hennessey elevator, center squaretop, 1902.	36 06 34.808	16 12 00.7	190 09 41.7	Burson.....	4.326982	21225.7	69638
	97 54 02.637	177 35 28.7	357 35 06.4	Waukomis.....	4.287237	19374.8	63565
		276 42 06.7	96 45 04.8	Parnell.....	3.891584	7613.5	24979
Section 29, southwest corner, T. 17 N., R. 7 W., 1902.	35 54 46.587	217 24 57.7	37 25 23.5	Burson.....	3.259436	1817.3	5962
	97 53 42.900	336 00 25.6	155 04 46.1	Eichhoff.....	4.423170	26495.4	86927
Kingfisher court-house, dome, 1902.	35 51 37.735	339 01 44.5	150 04 26.7	Eichhoff.....	4.289791	19489.1	63940
	97 55 55.073	11 01 48.6	180 59 42.6	Caddo.....	4.453282	28390.3	93104
		168 62 12.5	336 51 00.0	Burson.....	3.897508	7899.5	25917
Kingfisher College belfry, 1902.	35 52 03.580	845 84 23.9	165 36 17.5	Eichhoff.....	4.292530	19614.6	64352
	97 54 32.017	128 37 30.2	308 35 03.2	Section 29, southwest corner.	3.905895	8051.8	26417
		141 17 06.3	321 15 05.0	Burson.....	3.918580	8290.5	27200
Kingfisher stand-pipe, 1902.	35 51 43.600	338 49 48.5	158 52 34.0	Eichhoff.....	4.294661	19708.8	64661
	97 56 00.741	10 40 47.0	190 38 44.3	Caddo.....	4.455562	28547.1	93558
		157 18 54.1	337 17 44.9	Burson.....	3.897508	7677.0	25189
Guthrie stand-pipe, 1902. ¹	35 52 38.15	11 30 32	191 28 37	Edmonds.....	4.393072	24721.3	81106
	97 24 40.20	137 36 32	317 33 48	Wingard.....	4.017302	10400.4	34142
Guthrie, St. Joseph Church, east spire, 1902.	35 52 15.114	0 40 32.2	180 40 25.3	Edmonds.....	4.371359	23517.4	77157
	97 27 45.267	61 29 52.2	241 16 06.4	Eichhoff.....	4.000455	40406.0	132558
		164 11 03.1	344 10 07.5	Wingard.....	3.940688	8723.4	28620
Okarhe Catholic Church, spire, 1902.	35 43 44.610	0 06 03.6	186 05 30.7	Caddo.....	4.126045	13367.8	43886
	97 58 34.485	182 20 29.0	2 20 50.8	Burson.....	4.339724	21863.7	71731
		288 12 23.7	108 10 38.7	Eichhoff.....	4.063022	11561.7	37932
Okarhe elevator, center, top, 1902.	35 43 29.987	7 29 12.3	187 28 33.2	Caddo.....	4.112313	12951.3	42491
	97 58 23.885	181 36 44.0	1 36 58.7	Burson.....	4.348405	22305.2	73180
		286 20 21.9	106 30 30.7	Eichhoff.....	4.048175	11178.1	36057
Section 17, southeast corner, T. 14 N., R. 6 W., 1902. ¹	35 40 54.08	57 40 44	237 35 49	Caddo.....	4.177465	15047.6	49368
	97 51 05.70	169 29 17	349 29 10	Eichhoff.....	3.216357	1645.7	5399
Edmonds College, dome, 1902.	35 39 24.098	177 31 31.4	357 80 59.0	Wingard.....	4.507063	32185.7	105596
	97 28 24.683	250 55 17.6	70 55 34.2	Edmonds.....	2.878316	755.0	2479
		52 44 38.8	232 34 47.5	Yukon.....	4.507876	32201.5	105648

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Caddo school-house, water tank, center, 1902.	35 36 52.009	234 25 48.0	54 30 43.2	Eichhoff.....	4. 194035	15654.4	51359
	97 59 44.109	330 02 55.0	150 03 02.7	Caddo.....	2. 822342	604.3	2179
		26 05 55.0	206 03 12.1	Elreno west base.	4. 205651	16056.5	52679
Caddo reference mark, 1902. ¹	35 36 41.48	233 05 42	53 10 33	Eichhoff.....	4. 196027	15704.6	51524
	97 59 37.13	328 08 02	148 08 06	Caddo.....	2. 470504	295.4	969
Darlington water tank, center, 1902.	35 34 36.124	29 35 40.5	209 33 28.5	Elreno west base.	4. 070088	11767.6	38608
	98 00 33.778	203 38 46.3	23 30 22.8	Caddo.....	3. 595888	3943.6	12938
		336 47 12.9	156 49 37.7	Elreno east base.	4. 202924	15956.0	52349
Fort Reno high water tank, center, 1902. ¹	35 33 50.83	326 43 04	146 46 24	Elreno east base.	4. 200561	15869.4	52065
	98 02 09.71	21 00 14	200 58 55	Elreno west base.	3. 976206	9460.9	31059
Fort Reno low water tank, 1902. ¹	35 33 49.81	218 34 53	38 36 26	Caddo.....	3. 809420	6447.9	21154
	98 02 10.70	20 55 53	200 54 35	Elreno west base.	3. 974447	9428.6	30934
Fort Reno flag-pole, 1902. ¹	35 33 44.35	326 28 19	146 31 38	Elreno east base.	4. 195204	15674.9	51427
	98 02 07.70	21 44 10	201 42 51	Elreno west base.	3. 968451	9299.3	30509
Elrenostandpipe, 1902.	35 32 15.106	352 17 37.4	172 18 09.6	Elreno east base.	4. 017636	10414.4	34168
	97 57 19.784	61 12 20.9	241 08 14.3	Elreno west base.	4. 086772	12211.6	40064
		157 28 27.4	337 27 11.1	Caddo.....	3. 935317	9816.2	28268
		289 09 26.0	109 16 23.2	Yukon.....	4. 282659	19171.6	62899
Elreno, Kerfoot hotel, cupola, 1902.	35 32 02.919	352 56 00.1	172 56 28.5	Elreno east base.	4. 000908	10020.9	32877
	97 57 13.295	63 06 33.2	243 03 22.9	Elreno west base.	4. 085675	12180.8	39963
		157 24 47.5	337 24 27.5	Caddo.....	3. 955487	9025.8	29612
Elreno Catholic Church, spire, 1902.	35 31 55.477	351 34 17.2	171 34 50.4	Elreno east base.	3. 992177	9821.5	32228
	97 57 21.493	63 39 37.2	243 35 31.6	Elreno west base.	4. 076306	11893.4	39020
		159 10 19.4	339 09 04.1	Caddo.....	3. 962020	9162.6	30061
		287 23 34.2	107 30 32.5	Yukon.....	4. 279274	19022.8	62411
Elreno fire department, belfry, 1902.	35 31 55.273	352 25 54.8	172 26 24.5	Elreno east base.	3. 990982	9794.5	32134
	97 57 15.562	64 00 14.1	243 56 05.1	Elreno west base.	4. 080077	12024.8	39451
		158 19 08.4	338 17 49.6	Caddo.....	3. 964852	9222.6	30258
		287 30 41.3	107 37 36.1	Yukon.....	4. 275964	18878.3	61997
Elreno, Canadian Milling Co.'s elevator, east gable, 1902.	35 31 30.393	351 46 52.8	171 47 22.0	Elreno east base.	3. 955937	9035.2	29643
	97 57 15.624	67 22 31.4	247 18 22.4	Elreno west base.	4. 068465	11707.5	38410
		159 57 39.3	339 56 20.6	Caddo.....	3. 997326	9938.6	32607
		285 15 52.1	105 22 47.0	Yukon.....	4. 270995	18663.6	61232
Midland school-house, belfry, 1902.	35 29 37.782	290 33 22.2	116 37 38.8	Elreno east base.	4. 087187	12223.3	40103
	98 03 37.937	339 18 17.9	159 21 49.4	Carson.....	4. 416914	26116.4	85684
		48 22 20.0	228 21 53.2	Elreno west base.	3. 194807	1564.3	5132
Section 9, southeast corner, T. 11 N., R. 7 W., 1902.	35 26 07.162	6 23 04.7	180 22 18.7	Carson.....	4. 256656	18057.4	59243
	97 56 13.308	113 48 09.0	293 43 24.1	Elreno west base.	4. 131237	13528.1	44383
		164 37 55.5	344 37 49.0	Elreno east base.	3. 023989	1056.8	3467

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Oklahoma City church, highest spire, 1902. ¹	35 28 33.99	856 28 49	176 27 04	Smith.....	4. 024922	10590. 0	34746
	97 30 06.45	91 19 38	271 10 47	Yukon.....	4. 363070	23071. 2	75693
House with square roof, chimney, 1902. ¹	35 29 31.32	17 00 20	196 58 53	Smith.....	4. 110006	12900. 5	42324
	97 27 10.97	176 28 36	356 28 10	Edmonds.....	4. 268361	13850. 7	60862
Union Catholic Church, spire, 1902.	35 23 39.390	7 02 11.9	187 01 34.1	Carson.....	4. 130110	13493. 2	44269
	97 56 27.357	129 47 16.0	309 42 39.5	Elreno west base.	4. 194425	15646. 8	51335
		180 45 47.4	0 45 49.1	Elreno east base.	3. 746118	5573. 4	18285
Union Methodist Church, spire, 1902. ¹	35 23 37.33	129 57 28	309 52 51	Elreno west base.	4. 195634	15690. 4	51478
	97 50 27.21	180 43 02	0 43 04	Elreno east base.	3. 751040	5636. 9	18494
Union red elevator, center top, 1902.	35 23 38.397	7 40 52.9	187 40 11.7	Carson.....	4. 129747	13481. 8	44232
	97 56 21.491	129 31 44.0	309 27 04.0	Elreno west base.	4. 198134	15781. 0	51776
		179 14 18.2	350 14 10.4	Elreno east base.	3. 748510	5004. 2	18380
Boundary mark, Indian Territory and Oklahoma, 1902.	35 20 01.007	158 08 18.6	338 05 44.3	Elreno west base.	4. 250002	18032. 8	59163
	97 59 57.947	203 38 26.6	23 40 30.3	Elreno east base.	4. 128075	13429. 9	44061
		331 09 23.1	151 10 47.0	Carson.....	3. 881172	7000. 3	24955
Minco, Elmets Bond College, balfry, 1902.	35 18 58.306	14 00 51.6	194 09 24.3	Carson.....	3. 868191	4677. 5	16002
	97 56 45.536	148 13 51.5	328 09 25.7	Elreno west base.	4. 341752	21906. 1	72067
		182 08 35.3	2 08 47.5	Elreno east base.	4. 153675	14245. 4	46737
Minco red elevator, center top, 1902.	35 19 00.427	19 07 57.3	199 07 19.3	Carson.....	3. 705414	5074. 7	16649
	97 56 26.950	147 06 46.5	327 02 09.8	Elreno west base.	4. 345008	22101. 9	72709
		180 15 30.9	0 15 32.4	Elreno east base.	4. 151376	14170. 2	46490
Carson reference mark, 1902. ¹	35 16 33.47	15 29 50	195 29 54	Carson.....	2. 44056	275. 770	904. 78
	97 57 29.84	107 22 31	287 22 25	Old boundary post.	2. 44458	278. 3	913
Quarter section corner, sections 5 and 6, T. 9 N., R. 7 W., 1902. ¹	35 16 36.44	288 19 06	108 19 13	Reference mark.	2. 46322	290. 5	953
	97 57 40.70	330 29 07	150 29 12	Carson.....	2. 61312	410. 3	1346
Old boundary post, 1902. ¹	35 16 36.17	331 10 43	151 10 47	Carson.....	2. 60000	398. 2	1306
Moore elevator, west end of ridge, 1902. ¹	35 18 52.42	126 17 28	306 07 50	Yukon.....	4. 494049	81192. 4	102837
	97 28 44.07	109 02 49	849 02 10	Smith.....	3. 874415	7488. 8	24570
Norman stand-pipe, 1902. ¹	35 13 27.22	2 51 29	182 51 02	Purcell.....	4. 875030	23748. 2	77914
	97 26 03.02	102 28 19	342 26 13	Smith.....	4. 260590	18222. 0	59783
Norman College, balfry, 1902. ¹	35 12 33.21	0 07 54	180 07 52	Purcell.....	4. 343491	22054. 2	72350
	97 26 47.72	107 03 11	347 04 32	Smith.....	4. 290761	19532. 6	64063
Noble elevator, 1902.	35 08 10.557	17 54 10.0	197 52 20.5	Purcell.....	4. 172120	14863. 5	48765
	97 23 49.519	71 57 09.3	251 48 07.3	Lanier.....	4. 400028	25120. 5	82416
		161 48 26.8	341 45 04.6	Smith.....	4. 452988	23370. 6	93079
Quarter section corner, sections 7 and 8, T. 6 N., R. 2 W., 1902. ¹	35 00 28.24	119 07 45	299 07 33	Purcell.....	2. 770314	589. 27	1933. 3

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>	° ' "	° ' "	° ' "				
Marlow secondary, 1902.	34 42 46.582 97 56 22.085	301 48 19.0 20 23 54.5	121 49 32.5 200 20 16.3	Osaria..... Duncan.....	3.587338 4.449308	3866.7 28139.0	12686 92319
Boundary mile 45, 1902.	34 39 59.081 97 59 57.724	250 29 31.2 298 47 16.2	70 32 47.4 118 48 41.3	Osaria... Marlow National Bank. Marlow Baptist Church. Marlow Methodist Church.	3.908900 3.038341 3.020928 3.049558	9308.9 4348.5 4235.7 4402.3	30541 14267 13897 14040
Marlow latitude station, 1899.	34 38 50.54 97 57 38.54	270	90	Marlow longitude station.	0.49202	3.109	10.20
Marlow longitude station, 1899.	34 38 50.54 97 57 38.42	223 48.3 310 20.5	43 48.3 130 20.5	Marlow Baptist Church. Marlow Methodist Church.	2.57092 2.51046	372.3 328.4	1221 1077
Marlow azimuth station, 1899.	34 38 47.27 97 57 38.42	180 00	0 00	Marlow longitude station.	2.00430	101.00	331.4
Marlow National Bank, flag pole, 1902.	34 38 51.097 97 57 28.074	193 03 41.2 223 40 32.0	13 04 18.7 43 42 23.0	Marlow secondary. Osaria.....	3.871000 3.866704	7430.2 7190.6	24377 23591
Marlow Baptist Church, spire, 1902.	34 38 50.202 97 57 28.309	193 31 36.3 225 01 23.8	13 32 13.9 45 03 14.9	Marlow secondary. Osaria.....	3.857015 3.840837	7204.7 7028.1	23037 23068
Marlow Methodist Church, spire, 1902.	34 38 43.038 97 57 28.589	192 44 16.1 222 25 04.4	12 44 53.9 42 20 55.7	Marlow secondary. Osaria.....	3.885087 3.808116	7075.2 7381.0	25181 24216
Section 3, southeast corner, T. 2 N., R. 3 E., 1902. ¹	34 39 59.79 97 29 33.41	159 41 24	339 41 19	Table Hill.....	2.775974	597.0	1959
Section 21, southeast corner, T. 1 S., R. 1 W., 1902. ¹	34 26 03.08 97 17 59.06	101 27 48	281 27 31	Arbuckle Mountain.	2.903708	801.2	2629
Section 25, southwest corner, T. 1 S., R. 5 W., 1902. ¹	34 20 03.33 97 41 04.14	58 12 25	238 12 23	Arbuckle.....	1.917243	82.6	271
Duncan Baptist Church, spire, 1902. ¹	34 30 16.87 97 57 21.58	287 27 02 68 26 46	107 36 14 245 23 42	Arbuckle..... Duncan.....	4.410410 3.950015	20086.2 8912.8	85584 29241
Quarter section corner, sections 9 and 16, 1902. ¹	34 28 41.81 98 02 85.93	37 29 05	217 28 59	Duncan.....	2.642909	439.5	1442
Section 2, northeast corner, T. 4 S., R. 7 W., 1902. ¹	34 14 43.76 97 54 44.01	21 17 15	201 17 10	Monument....	2.832298	679.7	2230
Township corner, Ts. 3 and 4 S., Rs. 3 and 4 W., 1902. ¹	34 14 17.39 97 33 12.22	305 07 12	125 07 21	Lone tree.....	2.690931	490.8	1610
Section 24, southwest corner, T. 5 S., R. 7 W., 1902. ¹	34 05 34.22 97 33 09.85	102 07 52	282 07 49	Benton.....	2.093176	123.9	408

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Section corner, near station Grady, 1902. ¹	34 02 31.27 97 42 01.17	190 29 12	16 29 10	Grady.....	2.819544	600.0	2165
House east of station Grady, north gable, 1902.	34 00 30.875 97 37 53.478	111 42 41.7	291 34 06.0	Benton.....	4.405097	25415.4	83384
		125 10 10.0	305 07 55.8	Grady.....	3.877515	7542.5	24746
		190 47 23.8	10 50 10.4	Lone tree.....	4.420094	26308.4	80313
Nocona Baptist Church, cupola, 1902.	33 47 33.066 97 43 39.980	34 51 10.6	214 40 38.3	Queen.....	4.354615	22026.4	74233
		185 29 31.3	5 30 30.5	Grady.....	4.453898	29437.9	93300
		193 10 35.2	13 10 39.5	Blue.....	2.837014	865.0	2838
Nocona school-house, cupola, 1902.	33 47 29.250 97 43 34.906	35 17 38.4	215 12 57.2	Queen.....	4.354190	22604.2	74161
		150 03 35.1	335 58 11.5	Benton.....	4.503079	30010.7	120133
		184 03 55.4	4 03 56.9	Blue.....	2.983282	902.2	3157
		185 12 44.8	5 43 41.0	Grady.....	4.555500	35933.5	117892
Ringgold Presbyterian Church, spire, 1902. ¹	33 49 11.55 97 56 33.88	125 56 28	305 50 32	Cube.....	4.306930	20273.0	66514
		270 09 40	90 17 01	Blue.....	4.305804	20221.1	66342
Henrietta court-house, dome, 1902.	33 48 57.377 98 11 44.340	209 29 36.7	29 32 08.0	Cube.....	4.151052	14159.6	46455
		804 43 17.0	124 54 14.3	Queen.....	4.569235	37088.1	121080
		12 54 58.5	192 53 14.9	Myers.....	4.332907	21523.2	70014
Henrietta school-house, spire, 1902. ¹	33 48 47.64 98 11 29.73	207 35 09	27 37 32	Cube.....	4.153615	14243.4	46730
		14 04 59	194 03 08	Myers.....	4.328774	21319.4	69945
Henrietta stand-pipe, 1902.	33 49 12.670 98 11 40.490	210 06 13.0	30 08 42.7	Cube.....	4.136770	13701.6	44953
		305 24 14.9	125 35 09.3	Queen.....	4.571451	37277.9	122303
		321 03 54.6	141 10 15.4	Bowie north-west base.	4.449274	28136.7	92312
		12 53 38.1	192 51 52.3	Myers.....	4.342513	22004.0	72193
House, 5 miles southeast of Henrietta, southeast gable, 1902. ¹	33 45 51.25 98 07 59.13	34 51 39	214 47 50	Myers.....	4.208969	18572.4	60933
		183 45 36	3 40 02	Cube.....	4.257573	18095.6	59369
House on ridge, north chimney, 1902. ¹	33 42 05.77 97 59 40.80	70 34 53	250 26 31	Myers.....	4.395759	24874.8	81610
		155 05 38	335 01 23	Cube.....	4.440518	27575.2	90470
Bellevue, Webb's house, cupola, 1902.	33 37 47.900 98 01 29.823	292 34 11.5	112 34 53.2	Bowie north-west base.	3.322792	2102.8	6899
		316 42 19.6	136 44 47.8	Bowie south-east base.	4.003019	10069.8	33037
		23 45 51.7	203 43 59.3	Jones.....	4.114422	18014.3	42098
		89 04 32.0	208 57 08.4	Myers.....	4.314976	20632.7	67768
Bellevue M. E. Church, east gable, 1902. ¹	33 38 04.05 98 00 49.91	274 20 53	94 25 45	Queen.....	4.185294	13935.1	44800
		324 58 58	144 59 18	Bowie north-west base.	3.201040	1590.9	5219
Bellevue, Orton's windmill, 1902.	33 37 24.164 98 00 05.562	33 34 35.0	213 31 56.0	Jones.....	4.127576	18414.5	44011
		72 08 34.7	252 08 29.9	Bowie north-west base.	2.383550	241.8	793
		290 07 05.2	89 11 33.2	Queen.....	4.096012	12474.2	40926
		324 21 00.9	144 22 42.5	Bowie south-east base.	3.909-97	8118.9	26637
Bowdecker's windmill tower, 1902. ¹	33 34 29.47 97 57 23.51	335 35 08	155 36 20	Bowie south-east base.	3.125741	1335.8	4388
		140 18 11	320 16 36	Bowie north-west base.	3.838840	6899.9	22637

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Bowie National Hotel, cupola, 1902.	33 23 37.875	79 01 27.6	258 53 46.1	Jones.....	4.341875	21972.3	72087
	97 50 57.174	92 17 54.0	272 14 32.2	Bowie south-east base.	3.974071	9420.4	30907
		15 40 58.2	295 35 49.7	Bowie north-west base.	4.202492	15940.1	52297
		106 55 24.7	346 54 49.0	Queen.....	3.866065	7346.2	24102
Bowie Methodist Church, spire, 1902.	33 33 40.648	78 50 56.7	258 43 12.5	Jones.....	4.343835	22071.7	72414
	97 50 53.898	91 45 49.9	271 42 26.3	Bowie south-east base.	3.977809	9501.9	31174
		106 07 28.4	346 06 50.9	Queen.....	3.862303	7282.9	23894
Young's (J. B.) house, north chimney, 1902. ¹	33 32 49.37	130 28 29	310 24 40	Myers.....	4.134584	13632.8	44727
	98 08 08.65	298 14 54	118 16 42	Jones.....	3.758148	5728.9	18799
Chico church, with open spire, 1902.	33 22 10.665	15 29 23.9	195 26 05.5	Davis.....	4.546340	35193.6	115432
	98 54 14.378	43 30 45.3	223 23 58.0	Moore.....	4.449239	28134.5	92305
		105 24 11.2	285 20 05.3	Spradling.....	4.078565	11982.7	39813
Chico church, with square-top spire, 1902.	33 22 07.178	16 11 29.0	196 08 01.8	Davis.....	4.546466	35193.8	115465
	97 53 58.296	44 16 26.1	224 09 27.0	Moore.....	4.452482	28345.4	92997
		105 22 25.3	285 18 10.5	Spradling.....	4.093942	12412.0	40722
Jacksboro court-house, statue, 1902.	33 13 07.204	133 17 43.6	313 13 18.0	Indian.....	4.235718	17207.5	56455
	98 09 28.696	211 13 04.2	31 17 20.8	Spradling.....	4.367347	23299.5	76442
		310 27 27.5	130 28 58.7	Moore.....	3.753633	5670.7	18605
Jacksboro jail, cupola, 1902. ¹	33 13 02.66	210 50 57	30 55 11	Spradling.....	4.368704	23372.4	76681
	98 09 25.17	309 57 59	129 59 28	Moore.....	3.741195	5510.6	18079
Old chimney, northwest of Joplin, 1902. ¹	33 08 45.02	339 35 44	159 36 56	Davis.....	3.996700	9698.4	31819
	98 02 26.95	123 38 23	303 36 03	Moore.....	3.899854	7940.6	26052
Agnes, highest windmill, 1902. ¹	32 58 56.61	26 34 04	206 30 37	Gilbert.....	4.346923	22229.3	72931
	97 47 16.85	114 07 13	294 00 08	Davis.....	4.345626	22162.7	72712
Agnes, school-house, cupola, 1902. ¹	32 58 41.63	27 15 28	207 11 59	Gilbert.....	4.339385	21846.7	71675
	97 47 14.41	115 07 51	295 00 45	Davis.....	4.350491	22412.5	73532
Weatherford, tank near white house, 1902. ¹	32 45 29.29	358 44 28	178 44 47	Comanche.....	4.625632	42231.1	138553
	97 48 46.25	123 12 34	303 09 55	Gilbert.....	3.959176	9102.8	29865
Weatherford, white house with red roof, cupola, 1902. ¹	32 45 30.08	358 47 51	178 48 09	Comanche.....	4.625875	42254.7	138631
	97 48 44.68	122 56 23	302 53 44	Gilbert.....	3.960173	9123.7	29933
Weatherford, yellow house with dark roof, cupola, 1902. ¹	32 44 18.63	0 57 11	180 56 58	Comanche.....	4.602803	40030.0	131397
	97 47 46.27	127 53 50	307 50 38	Gilbert.....	4.066777	11602.1	38261
Lingleville school-house, cupola, 1902.	33 14 26.436	229 11 57.9	49 14 54.1	Gatlin.....	4.184192	15282.4	50139
	98 22 39.386	264 19 57.7	84 27 36.4	Pilot.....	4.354139	22601.6	74152
		281 32 59.1	101 41 21.6	Stephenville north base.	4.401204	25188.6	82640
		283 27 40.3	103 39 36.1	Lone Mountain.	4.558486	36181.4	118705
		294 08 45.4	114 12 30.9	Alarm.....	4.186696	15370.8	50429
Lingleville, open balfry, 1902. ¹	32 14 33.16	809 10 38.3	129 12 55.9	Young.....	3.940449	8718.6	28604
	98 22 37.08	229 37 39	49 41 34	Gatlin.....	4.179030	15101.8	49546
		310 28 13	130 30 29	Young.....	3.944718	8804.8	28887

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Stephenville courthouse, tower, center, 1902.	32 13 11.996	32 10 30.3	212 09 45.1	Alarm.....	3.674478	4725.8	15505
	98 12 07.828	158 01 58.4	338 00 15.3	Gatlin.....	4.121822	13238.0	43432
		288 50 46.0	108 53 32.2	Stephenville north base.	3.934348	8597.0	28205
		318 11 16.1	138 14 00.4	Stephenville south base.	4.083430	12118.0	39757
		0 06 19.1	180 06 18.0	Gibson.....	4.486550	30658.4	100585
Stephenville, oil mill, stack, 1902. ¹	32 13 18.77	24 24 01	204 23 22	Alarm.....	3.664794	4021.0	15163
	98 12 31.02	160 11 45	340 10 17	Gatlin.....	4.108107	12826.5	42082
Stephenville, Tarleton College, dome center, 1902.	32 13 01.623	19 51 44.9	199 51 17.9	Alarm.....	3.592586	3913.5	12840
	98 12 53.139	163 21 01.4	343 19 42.5	Gatlin.....	4.118829	13147.1	43133
		284 45 42.1	104 48 51.8	Stephenville north base.	3.964131	9641.2	31631
		313 13 53.3	133 17 01.7	Stephenville south base.	4.104431	12718.4	41727
Longhouse, north center chimney, 1902.	32 12 18.436	69 18 30.8	249 17 06.4	Young.....	3.646745	4433.5	14540
	98 15 43.027	182 46 48.4	2 47 02.4	Gatlin.....	4.144319	13941.8	45741
		306 58 53.7	126 59 57.2	Alarm.....	3.591800	3900.7	12817
Johnsonville cotton gin, stack, 1902. ¹	32 08 44.04	140 04 57	820 01 19	Pilot.....	4.221039	16685.6	54579
	98 01 32.26	223 55 07	43 55 47	Lone Mountain.	3.456904	2863.9	9396
Skippers Gap windmill, 1902.	32 08 46.460	116 26 32.7	296 21 51.7	Stephenville north base.	4.084339	12143.4	39840
	98 00 02.034	134 13 19.0	314 08 53.6	Pilot.....	4.259854	18190.9	59681
		169 14 53.2	349 14 45.6	Lone Mountain.	3.306132	2023.6	6639
Dublin standpipe, 1902.	32 05 29.603	199 53 20.1	19 54 41.1	Young.....	4.069132	11725.5	38469
	98 20 53.051	227 41 14.9	47 45 03.5	Alarm.....	4.182528	15224.0	49947
		242 20 04.0	62 27 29.0	Stephenville north base.	4.393349	24737.1	81158
		255 57 54.5	76 08 52.5	Lone Mountain.	4.523934	33414.4	109627
		302 22 00.3	122 34 50.1	Gleason.....	4.655384	45225.6	148378
	320 01 29.1	140 06 10.4	Gibson.....	4.339603	21409.8	70240	
Dublin high school, cupola, 1902.	32 05 19.040	195 05 15.1	15 06 17.2	Young.....	4.070277	11756.5	38571
	98 20 18.190	224 19 53.9	44 23 23.6	Alarm.....	4.169698	14780.8	48493
		224 33 42.9	44 40 05.3	Pilot.....	4.427915	26786.4	87882
		240 37 34.0	00 44 40.1	Stephenville north base.	4.381574	24075.4	78987
		255 01 08.8	75 11 47.9	Lone Mountain.	4.513161	32595.8	106941
		255 08 18.5	75 15 23.0	Stephenville south base.	4.335564	21655.3	71047
	302 39 38.2	122 52 09.1	Gleason.....	4.646076	44266.6	145231	
	321 26 01.8	141 30 20.6	Gibson.....	4.313207	20568.7	67482	
Dublin church, tall spire, 1902.	32 05 17.490	224 52 20.3	44 58 47.7	Pilot.....	4.431270	26994.2	88563
	98 20 27.730	240 49 19.7	60 56 30.8	Stephenville north base.	4.385893	24315.5	79775
		255 11 31.2	75 18 40.8	Stephenville south base.	4.340614	21908.6	71878
		320 48 49.3	140 53 13.1	Gibson.....	4.815781	20691.0	67884
Dublin oil mill, center, 1902. ¹	32 05 14.04	194 40 00	14 41 01	Young.....	4.075290	11892.7	39018
	98 20 16.32	223 46 55	43 50 23	Alarm.....	4.171941	14867.3	48744
Purves school-house, cupola, 1902.	32 00 18.154	214 48 24.0	34 53 21.1	Stephenville north base.	4.409188	26655.9	84173
	98 16 16.311	224 34 21.5	44 39 17.1	Stephenville south base.	4.317878	20791.1	68212
		316 30 43.7	136 32 54.1	Gibson.....	3.973189	9401.3	30844

¹ No check on this position.

Geographic positions—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Purves, cotton gin, stack, 1902.	32 00 10.630 98 16 15.572	214 28 41.2 224 05 24.0 315 36 31.8	34 33 37.8 44 10 19.2 135 38 41.3	Stephenville north base. Stephenville south base. Gibson.....	4.412218 4.321046 3.964778	25835.6 20943.3 9221.0	84762 68711 30253
Carlton cotton gin, stack, 1902.	31 55 15.810 98 10 15.098	129 31 52.2 191 59 50.1 351 31 50.0	309 30 51.4 12 01 33.8 171 33 17.4	Gibson..... Stephenville south base. Chambliss.....	3.592389 4.391861 4.472137	3911.9 24652.5 29657.6	12834 80881 97302
Olin cotton gin, stack, 1902. ¹	31 57 26.15 98 06 00.63	302 29 51 2 00 26	122 34 48 183 59 39	Gleason..... Chambliss.....	4.242052 4.524151	17460.3 33431.1	57284 109682
Evans(?) (U. S. G. S.), 1902. ¹	31 52 21.14 97 56 40.13	63 15 37	243 15 37.	Gleason.....	0.84217	6.95	22.8
White church spire, southeast of Chambliss, 1902. ¹	31 37 16.01 98 03 21.00	16 42 05 120 57 37	196 40 05 300 55 27	Brown..... Chambliss.....	4.324919 3.882450	21131.0 7628.7	69327 25028
Copperas Cove, church spire, 1902. ¹	31 07 20.84 97 53 57.09	77 02 08 133 25 22	257 01 05 313 20 36	Gilmore..... Franklin.....	3.525673 4.302806	3354.8 20082.0	11007 65886
Copperas Cove schoolhouse, cupola, 1902. ¹	31 07 16.98 97 53 57.06	79 02 20 133 40 01	259 01 16 313 35 15	Gilmore..... Franklin.....	3.522586 4.304504	3331.1 20164.8	10929 66157
Waters Mountain (U. S. G. S.), 1902.	31 05 31.508 98 20 36.996	237 10 11.5 279 40 47.0 294 41 17.2 296 46 39.5	57 13 06.5 99 47 12.3 114 48 53.9 116 51 57.9	Flat Top..... Lampasas northeast base. Bachelor..... Lampasas southwest base.	4.028568 4.302562 4.412671 4.263350	10679.9 20070.7 25862.6 18337.9	35039 65849 84851 60164
Lampasas court-house, dome, 1902. ¹	31 03 55.39 98 10 39.61	354 20 49 141 56 40	174 20 59 321 54 26	Lampasas southwest base. Flat Top.....	3.727405 4.045834	5338.3 11113.1	17514 36460
Lampasas, spring-house, cupola, 1902. ¹	31 04 03.66 98 10 33.60	140 28 31 280 15 24	320 26 15 100 16 38	Flat Top..... Lampasas northeast base.	4.041952 3.585335	11014.2 3848.9	36136 12628
Lampasas school-house, cupola, 1902. ¹	31 04 06.52 98 10 51.94	351 25 22 142 11 26	171 25 39 322 09 19	Lampasas southwest base. Flat Top.....	3.757335 4.027008	5719.2 10641.6	18764 34913
Lampasas First Baptist Church, spire, 1902.	31 03 51.218 98 10 56.954	144 15 13.1 313 38 42.9 349 13 51.5	324 13 08.4 133 41 20.5 169 14 10.7	Flat Top..... Bachelor..... Lampasas southwest base.	4.038999 4.049478 3.722380	10939.5 11206.7 5276.9	35891 26767 17313

LAMPASAS TO SEGUIN, TEX.

<i>Principal points.</i>							
Buzzard, 1903.....	30 38 55.752 98 06 11.383	150 08 15.55 235 05 12.81	330 03 50.10 55 10 57.06	May..... Gabriel.....	4.4423972 4.3397557	27094.73 21865.31	90881.8 71736.4
Post, 1903.....	30 45 06.259 98 14 40.039	185 58 13.36 306 58 26.32	5 58 38.76 127 03 16.65	May..... Buzzard.....	4.1027045 4.2776623	12667.90 18952.32	41561.3 62179.4

¹ No check on this position.

Geographic positions—Continued.

LAMPASAS TO SEGUIN, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Travis, 1903.....	30 30 58.822	149 02 53.66	329 00 05.32	Buzzard.....	4.2337416	17129.38	56198.6
	97 59 40.510	198 33 43.73	18 36 38.09	Gabriel.....	4.4578063	28051.80	94100.2
Shoval, 1903.....	30 26 30.557	180 39 17.27	0 39 24.78	Post.....	4.5360432	34356.21	112726.8
	98 14 54.802	214 04 59.41	34 09 55.92	Buzzard.....	4.4427981	27720.18	90945.3
		251 13 19.46	71 21 03.21	Travis.....	4.4107389	25747.73	84474.0
Shingle, 1903.....	30 18 13.223	136 20 21.22	316 15 44.10	Shovel.....	4.3269761	21182.44	69496.1
	98 05 46.730	202 29 40.23	22 32 45.60	Travis.....	4.4069041	25821.35	83731.4
Barton, 1903.....	30 18 17.791	89 44 15.66	209 36 30.20	Shingle.....	4.3917940	24048.70	80688.3
	97 50 24.288	111 13 54.47	291 01 30.93	Shovel.....	4.6242322	42095.17	138107.7
		147 40 59.13	327 36 17.57	Travis.....	4.4431341	27741.70	91016.1
Cedar, 1903.....	30 11 22.624	132 51 35.89	312 47 18.87	Shingle.....	4.2685106	18599.90	61023.2
	97 57 16.479	220 44 05.42	40 47 33.06	Barton.....	4.2273356	10878.57	35375.5
Loneman, 1903.....	30 04 36.193	178 18 22.17	358 18 08.17	Shingle.....	4.4008982	25169.13	82575.7
	98 05 18.887	225 51 43.70	45 55 45.93	Cedar.....	4.2648361	17981.88	58995.6
Carpenter, 1903.....	30 05 38.351	84 18 01.55	264 12 05.68	Loneman.....	4.2811896	19100.87	62686.5
	97 53 28.982	150 08 39.45	330 06 45.21	Cedar.....	4.0872485	12224.99	40108.2
		191 55 02.30	11 56 35.20	Barton.....	4.3784174	23001.07	78415.4
Krueger, 1903.....	29 57 43.844	138 58 25.67	318 54 58.96	Loneman.....	4.2268022	16857.85	55307.8
	97 58 25.710	208 30 28.32	28 32 56.81	Carpenter.....	4.2213482	10647.47	34617.6
Hugo, 1903.....	29 56 23.919	199 10 41.29	19 12 19.75	Loneman.....	4.2054682	16049.75	52656.6
	98 08 35.755	234 50 48.73	54 58 22.34	Carpenter.....	4.4727110	20696.89	97430.5
		261 27 18.34	81 32 22.91	Krueger.....	4.2185460	16540.40	54268.3
Gus, 1903.....	29 48 46.694	161 29 57.80	341 28 30.30	Hugo.....	4.1716247	14846.52	48709.0
	98 05 40.091	216 10 05.37	35 13 41.82	Krueger.....	4.3089020	20220.97	66341.6
Tieken, 1903.....	29 43 04.229	138 37 15.80	318 34 24.05	Gus.....	4.1479208	14057.91	46121.7
	97 59 54.022	184 59 57.48	5 00 41.42	Krueger.....	4.4341216	27172.00	89140.8
Mission or Mission Hill (U.S.G.S.), 1903.	29 42 52.761	211 55 30.74	31 57 36.29	Gus.....	4.1086406	12842.23	42133.2
	98 09 52.996	268 42 08.45	88 47 05.36	Tieken.....	4.2069129	16103.23	52832.0
Bear, 1903.....	29 47 06.921	201 53 01.88	21 55 09.80	Hugo.....	4.2068055	18484.40	60644.2
	98 12 52.664	253 09 27.40	75 13 02.37	Gus.....	4.0797698	12016.27	39423.4
		328 19 08.83	148 20 38.00	Mission.....	3.9635368	0194.68	30166.2
Seguin west base, 1901.	29 39 16.232	122 51 54.79	302 48 44.55	Mission.....	4.0897004	12294.20	40335.2
	98 03 28.807	133 45 33.35	313 40 53.82	Bear.....	4.3215757	20968.90	68795.5
		168 39 05.36	348 38 00.25	Gus.....	4.2532251	17915.34	58777.2
		219 25 35.40	39 27 21.79	Tieken.....	3.9585620	9089.96	29822.6
Seguin east base, 1901 ¹	29 40 38.416	68 09 05.22	248 07 06.16	Seguin west base.....	3.8321633	6794.59	22291.9
	97 59 34.316	104 00 31.08	283 55 24.59	Mission.....	4.2339858	17139.01	56280.2
		119 11 48.44	299 05 12.51	Bear.....	4.3903005	24564.08	80590.0
		146 51 01.69	326 48 00.22	Gus.....	4.2543488	17961.76	58929.5
		173 16 17.63	353 16 07.87	Tieken.....	3.6552055	4520.70	14831.7
Mott, 1903.....	29 35 53.583	123 47 37.42	303 41 41.98	Mission.....	4.3661277	23234.20	76227.5
	97 57 54.631	124 47 07.19	304 44 21.98	Seguin west base.....	4.0391403	10943.10	35902.5
		163 00 20.43	342 59 31.13	Seguin east base.....	3.9624004	9170.66	30087.4
		166 23 44.53	346 22 45.45	Tieken.....	4.1348991	13642.66	44759.3
Herndon, 1903.....	29 32 41.524	165 19 32.01	345 18 01.36	Mission.....	4.2890395	19455.37	63829.8
	98 06 49.633	203 57 35.74	23 59 14.92	Seguin west base.....	4.1238676	13300.18	43635.7
		210 18 09.66	30 16 35.14	Tieken.....	4.3462442	22194.44	72816.8
		218 32 57.57	38 36 32.66	Seguin east base.....	4.2737549	18782.56	61322.4
		247 38 18.85	67 42 42.88	Mott.....	4.1922183	15567.30	51078.7

¹ No check on this position.

Geographic positions—Continued.

LAMPASAS TO SEGUIN, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Central, 1903.....	29 31 20.885	108 23 58.26	288 21 41.47	Herndon.....	3.8061794	7873.71	25832.3
	98 02 12.139	171 58 50.54	351 58 12.68	Seguin west base.	4.1696940	14780.33	48491.8
		193 53 06.52	13 54 24.47	Seguin east base.	4.2475694	17683.55	58016.8
		219 31 33.85	39 33 40.90	Mott.....	4.0369463	10887.95	35721.5
Thomas, 1904.....	20 25 40.885	137 33 53.91	317 30 58.97	Central.....	4.1519580	14189.20	46552.4
	97 58 16.612	172 02 26.87	352 01 37.38	Mott.....	4.2798523	19048.13	62403.7
Lavernia, 1904....	29 18 52.004	185 09 24.68	5 10 00.74	Herndon.....	4.4089810	25043.72	81322.8
	98 08 15.243	202 58 39.83	23 01 38.18	Central.....	4.3987829	25048.57	82180.2
		236 56 45.68	57 02 38.14	Thomas.....	4.3638139	23110.74	75822.5
<i>Supplementary points.</i>							
Austin, Capitol dome, star in hand of Liberty, 1903.	30 16 27.968	30 04 25.02	215 59 51.53	Carpeniter....	4.3933353	24736.33	81155.8
	97 44 25.032	05 33 02.57	245 26 34.14	Cedar.....	4.3554508	22689.96	74376.4
		109 25 48.76	289 22 47.57	Barton.....	4.0076815	10178.45	33393.8
Bertram Methodist Church, spire, 1903. ¹	30 44 27.33	261 22 23	81 27 14	Gabriel.....	4.185483	15327.9	50288
	98 03 27.02	15 13 27	195 12 34	Buzzard.....	4.024559	10581.8	34717
Bertram, railroad windmill, 1903. ¹	30 44 32.06	261 43 54	81 49 39	Gabriel.....	4.175270	14971.7	49120
	98 03 14.29	16 45 14	190 44 15	Buzzard.....	4.034032	10815.1	35483
Shingle Hill (U.S. G.S.), 1903.	30 18 13.374	312 47 33.8	132 51 50.8	Cedar.....	4.2096303	18605.3	61041
	98 05 46.843	326 48 52.2	146 48 52.2	Shingle.....	0.744443	5.552	18.22
		136 20 11.3	316 15 34.3	Shovel.....	4.3258642	21177.0	69478
Shovel Mountain (U.S.G.S.), 1903.	30 26 30.559	316 16 18.4	136 20 55.3	Shingle Hill (U.S.G.S.).	4.3257773	21172.8	69464
	98 14 54.570	80 25 44.4	269 25 44.3	Shovel.....	0.771878	5.914	19.40
Austin Colored Asylum, stand-pipe, 1903. ¹	30 18 32.03	57 46 58	237 40 23	Cedar.....	4.363817	24703.8	81240
	97 44 13.30	87 29 37	267 20 30	Barton.....	3.990589	9921.8	32352
Austin Colored Asylum, dome at south end, 1903. ¹	30 18 26.15	58 08 04	238 01 20	Cedar.....	4.392086	24605.3	80023
	97 44 13.41	88 32 15	268 29 08	Barton.....	3.996185	9912.5	32521
Austin latitude station, 1872. ¹	30 16 22.34						
	97 44 20.01						
Austin north meridian, 1872. ¹	30 16 26.00	0 00 00	180 00 00	Austin latitude station.		112.65	369.6
	97 44 20.01						
Austin longitude station, 1895. ¹	30 16 28.15	0 00 00	180 00 00	Austin north meridian.		4.42	14.5
	97 44 20.01						
Austin, University of Texas, main tower, 1895. ¹	30 17 07.21						
	97 44 21.63						
St. Edwards College, chapel, spire, 1903. ¹	30 13 47.24	40 57 33	220 53 28	Carpenter.....	4.299374	19923.9	65267
	97 45 21.23	76 56 46	256 50 46	Cedar.....	4.293171	19641.3	64440
Cedar Hill (U. S. G. S.). ¹	30 11 22.58	109 07 37.4	289 07 37.2	Cedar.....	0.930287	8.517	27.94
	97 57 16.18						
Kyle cotton gin, tank, 1903. ¹	30 00 19.16	75 21 21	255 15 40	Krueger.....	4.276968	18917.7	62066
	97 47 03.07	133 34 45	313 31 32	Carpanter.....	4.154252	14264.4	46799

¹ No check on this position.

Geographic positions—Continued.

LAMPASAS TO SEGUIN, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Hornbortel's (August) gin, stack, 1903. ¹	29 42 05.14	212 28 54	32 29 16	Tiaken.....	3.338850	2157.0	7077
	08 00 37.12	327 41 12	147 41 44	Seguin east base.	3.499571	3169.2	10365
New Braunfels Catholic Church, spire, 1903.	29 42 11.726	109 38 21.9	289 37 16.6	Mission.....	3.575289	3760.9	12339
	98 07 41.216	137 23 05.2	317 20 30.7	Bear.....	4.091840	12354.9	40534
		194 58 21.9	14 59 22.1	Gus.....	4.090991	12589.0	41302
		262 37 67.7	82 41 49.2	Tiaken.....	4.102491	12661.7	41641
		306 23 11.3	126 28 01.4	Mott.....	4.292424	19607.6	64329
	308 30 29.0	128 32 34.0	Seguin west base.	3.938276	8675.1	28462	
New Braunfels spire, massive base, slim cone, 1903.	29 42 02.972	192 16 42.8	12 17 32.8	Gus.....	4.104555	12722.0	41739
	98 07 20.846	261 02 40.7	81 06 22.2	Tiaken.....	4.084857	12157.9	39888
		281 41 38.3	101 45 29.4	Seguin east base.	4.107557	12810.2	42028
New Braunfels courthouse, tower, 1903.	29 42 11.70	193 35 25.3	13 36 19.6	Gus.....	4.097398	12512.7	41052
	98 07 29.59	262 26 39.5	82 30 25.3	Tiaken.....	4.091731	12351.8	40524
		309 49 69.7	129 51 38.9	Seguin west base.	3.925940	8432.2	27665
		108 10 07.0	288 08 56.0	Mission.....	3.608198	4056.9	13310
New Braunfels standpipe, 1903.	29 41 48.677	115 39 18.5	295 37 57.8	Mission.....	3.658907	4559.4	14959
	98 07 20.039	137 39 28.0	317 36 43.0	Bear.....	4.122605	13261.9	43510
		191 47 02.6	11 47 52.2	Gus.....	4.118967	13148.2	43137
		258 59 23.7	79 03 04.7	Tiaken.....	4.096861	12214.1	40072
		279 46 08.7	99 49 59.3	Seguin east base.	4.104085	12708.2	41693
		305 40 20.8	125 45 00.5	Mott.....	4.272555	18730.7	61452
	307 01 39.3	127 03 38.8	Seguin west base.	3.891617	7791.4	25562	
Kingsbury, tall, heavy stack with cross, 1903. ¹	29 38 54.74	55 21 08	235 14 58	Central.....	4.390000	24547.1	80535
	97 49 42.26	67 11 55	247 07 52	Mott.....	4.157538	14872.7	47154
Church, red spire, 1903. ²	29 36 01.46	271 30 34	01 33 21	Mott.....	3.957484	9067.4	29749
	98 03 31.47	40 65 16	220 53 38	Herndon.....	3.910897	8145.1	26723
Round tank, light colored, east of Seguin, 1903. ²	29 34 29.32	115 44 55	295 43 16	Mott.....	3.776324	5974.8	19602
	97 54 34.64	151 34 16	331 31 38	Tiaken.....	4.256031	18031.5	59158
Marion Lutheran Church, spire, 1903. ²	29 34 13.26	297 01 57	117 05 07	Central.....	4.068951	11666.8	38277
	98 08 28.04	314 03 24	134 04 17	Herndon.....	3.608669	4061.3	13324
Marion, Schultz & Dreyer's cotton gin, stack, 1903. ²	29 34 20.58	299 15 54	119 18 54	Central.....	4.053429	11309.1	37103
	98 08 18.49	321 53 15	141 53 58	Herndon.....	3.588397	3876.1	12717
Seguin oil factory, water tower, 1903.	29 34 57.364	348 56 58.3	168 57 59.5	Thomas.....	4.241958	17456.5	57272
	97 58 20.745	43 04 50.8	223 02 56.8	Central.....	3.960144	9123.1	29931
		73 03 24.3	252 59 18.2	Herndon.....	4.156030	14322.9	46991
		133 54 05.7	313 51 33.4	Seguin west base.	4.060651	11498.8	37726
		202 05 40.1	22 05 53.0	Mott.....	3.271416	1868.2	6129
Seguin court-house, spire, 1903.	29 34 05.779	54 11 35.9	284 09 27.1	Central.....	3.938217	8674.0	28458
	97 57 50.920	167 03 56.7	347 02 05.6	Seguin east base.	4.098597	12405.0	40699
		168 42 49.8	348 41 48.4	Tiaken.....	4.228043	18906.1	55466
	178 16 35.5	353 16 38.7	Mott.....	3.521233	3320.7	10895	
Seguin school-house, short tower with two collars, 1903.	29 34 28.577	51 01 12.1	230 59 01.4	Central.....	3.962987	9183.1	30128
	97 57 47.056	167 52 10.7	347 51 07.9	Tiaken.....	4.210581	18239.8	53280
		175 32 48.1	355 32 42.4	Mott.....	3.419162	2825.2	8613

¹ No check on this position.

² Checked by vertical angles only.

Geographic positions—Continued.

LAMPASAS TO SEGUIN, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
Seguin standpipe, 1903.	29 34 03.162	80 12 15.9	280 07 50.2	Herndon.....	4.167887	14719.3	48292
	97 57 50.901	134 55 31.0	314 48 04.7	Bear.....	4.534140	34209.0	112234
		138 41 50.4	316 39 03.4	Seguin west base.....	4.122231	18250.5	43473
		167 07 46.2	347 06 55.2	Seguin east base.....	4.096341	12483.6	40957
		168 45 54.5	348 44 53.7	Tieken.....	4.230069	16985.1	55725
	178 18 30.7	358 18 28.8	Mott.....	3.531637	3401.2	11159	
Seguin, Zanke's gin, brick chimney, 1903.	29 34 27.905	349 11 58.6	169 12 55.0	Thomas.....	4.217972	16518.6	54195
	97 58 11.448	48 23 31.5	228 21 32.7	Central.....	3.937957	8668.8	28441
		76 49 17.6	256 45 01.9	Herndon.....	4.156210	14328.8	47010
		134 39 58.6	314 32 42.2	Bear.....	4.522180	33279.7	109185
		136 08 10.8	316 05 33.9	Seguin west base.....	4.090516	12317.3	40411
		168 56 54.0	348 56 13.0	Seguin east base.....	4.065342	11623.6	38135
		170 09 42.3	350 08 51.5	Tieken.....	4.207769	16135.0	52936
	189 44 04.7	9 44 12.9	Mott.....	3.427565	2676.5	8781	
Seguin, cotton compress building, top, 1903. ¹	29 34 55.54	73 52 16	253 47 55	Herndon.....	4.170886	14820.6	46624
	97 58 00.84	132 18 50	312 16 08	Seguin west base.....	4.070582	11928.4	39135
Seguin, spire, 1903. ²	29 34 24.75	167 28 54	347 28 07	Seguin east base.....	4.071350	11785.6	38067
	97 57 59.31	182 38 10	2 38 12	Mott.....	3.437448	2738.1	8983
Seguin Milling & Power Co.'s tank, 1903.	29 34 25.910	68 10 26.0	248 07 59.1	Herndon.....	3.936358	8036.9	28336
	98 01 51.838	163 44 08.6	343 43 20.7	Seguin west base.....	3.969034	9311.8	30550
		247 03 46.9	67 05 44.0	Mott.....	3.840804	6931.1	22740
Seguin Catholic Church, spire, 1903. ¹	29 33 58.61	55 18 57	235 16 49	Central.....	3.930950	8530.0	27986
	97 57 51.67	178 42 41	358 42 40	Mott.....	3.549102	3540.8	11617
Herndon Hill (U. S. G. S.), 1903.	29 32 41.425	129 30 08	309 30 08	Herndon.....	0.63438	4.309	14.14
	98 06 49.510	165 19 05.7	345 17 34.9	Mission or Mission (U. S. G. S.).....	4.289118	19458.9	63841
Stains church, spire, 1903.	29 28 39.756	30 08 43.1	210 05 32.0	Lavernia.....	4.320572	20920.5	68637
	98 01 45.904	171 53 42.4	351 53 29.5	Central.....	3.699292	5011.0	16440
		301 48 07.0	121 50 48.8	Thomas.....	4.018859	10443.8	34264
St. Hedwig Catholic Church, 1903. ¹	29 24 55.70	234 15 29	54 20 30	Central.....	4.307985	20322.5	66675
	98 12 24.67	328 59 12	149 01 14	Lavernia.....	4.116045	13063.1	42858

SEGUIN TO ALICE, TEX.

<i>Principal points.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>				
Stockdale, 1904...	29 14 42.591	111 11 54.10	291 05 54.45	Lavernia.....	4.3280497	21283.82	69828.7
	97 55 59.873	178 43 28.84	358 43 20.64	Thomas.....	4.3069106	20272.65	66511.2
Berita, 1904.....	29 11 08.497	169 44 55.00	349 44 06.27	Lavernia.....	4.1614317	14502.18	47579.1
	98 06 39.600	212 00 07.08	32 05 12.02	Thomas.....	4.5008800	31686.92	103959.5
		249 04 26.02	69 09 48.27	Stockdale.....	4.2670283	18493.89	60675.4
Karnes, 1904.....	28 52 38.640	150 39 02.17	330 33 16.91	Berita.....	4.5934934	89218.72	128670.1
	97 54 48.145	177 18 46.00	357 16 11.16	Stockdale.....	4.6107284	40806.41	133879.0
Ruckman, 1904..	29 01 36.729	46 06 44.05	228 01 36.65	Karnes.....	4.3779870	23877.40	78337.8
	97 44 13.119	115 53 40.33	295 42 45.37	Berita.....	4.6068098	40439.88	132676.5
		141 45 08.24	321 39 24.13	Stockdale.....	4.4889427	30827.81	101140.9
Choate, 1904.....	28 43 00.104	123 45 35.99	313 40 05.10	Karnes.....	4.4111624	25772.85	84556.4
	97 43 21.241	177 39 41.45	357 29 16.40	Ruckman.....	4.5368230	34405.11	112877.4

¹ Checked by vertical angles only.

² No check on this position.

Geographic positions—Continued.

SEGUIN TO ALICE, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Principal points—Continued.</i>							
Bryde, 1904.....	28 44 54.794	170 34 14.67	350 33 32.49	Karnes.....	4.1806379	14475.64	47492.2
	97 53 20.631	205 38 55.84	25 43 20.33	Ruckman.....	4.5343789	84227.77	112735.6
		282 12 20.94	102 17 15.03	Choate.....	4.2212576	16048.99	54606.2
Pettus, 1904.....	28 39 11.653	137 14 48.24	317 11 55.32	Bryde.....	4.1581134	14391.91	47217.5
	97 47 20.547	222 42 54.20	42 44 49.16	Choate.....	3.9811132	9674.44	31412.1
Borroum, 1904....	28 37 18.096	183 35 07.36	3 35 22.93	Bryde.....	4.1482506	14068.59	46156.7
	97 53 53.037	261 54 30.84	71 57 38.96	Pettus.....	4.0497475	11213.66	38790.1
Wiess, 1904.....	28 33 39.560	112 56 04.09	292 51 22.77	Borroum.....	4.2390296	17339.22	56887.1
	97 44 05.216	152 34 45.03	832 33 11.51	Pettus.....	4.0613968	11615.52	37790.8
		183 57 23.49	3 57 44.59	Choate.....	4.2879797	17297.35	56749.7
Fleming, 1904....	28 27 32.833	184 28 20.24	4 28 45.05	Borroum.....	4.2574537	18090.63	59352.3
	97 54 44.986	230 58 38.34	57 03 43.71	Wiess.....	4.3108010	20730.63	68043.3
Beeville, 1904....	28 27 22.579	91 21 46.75	271 17 48.62	Fleming.....	4.1335297	13599.71	44618.4
	97 46 25.259	146 28 11.80	326 24 37.85	Borroum.....	4.3428552	22021.92	72250.2
		198 09 20.38	18 10 36.22	Wiess.....	4.0868034	12214.15	40072.6
Miller, 1904.....	28 18 06.751	149 09 54.77	329 06 52.98	Fleming.....	4.3074094	20300.11	66801.3
	97 48 22.538	190 33 47.75	10 34 43.49	Beeville.....	4.2406952	17405.85	57105.7
O'Neill, 1905.....	28 19 56.064	71 33 17.89	251 30 22.47	Miller.....	4.0262056	10621.98	34848.9
	97 42 12.721	124 31 25.66	304 25 27.91	Fleming.....	4.3951751	24841.34	81500.3
		153 26 39.85	333 24 39.76	Beeville.....	4.1866403	15368.81	50422.5
Skelly, 1904.....	28 12 32.735	177 43 12.60	357 43 05.49	Miller.....	4.0124243	10290.21	33760.5
	97 48 07.514	215 17 47.55	35 20 35.59	O'Neill.....	4.2233831	10725.65	34874.1
Welder, 1904.....	28 10 33.529	104 16 33.80	284 12 23.37	Skelly.....	4.1736025	14916.35	48998.1
	97 39 17.425	133 13 38.59	313 09 20.67	Miller.....	4.3052875	20383.91	66376.2
		164 35 06.38	344 33 43.40	O'Neill.....	4.2543976	17063.78	58936.2
Mathis, 1904.....	28 05 30.409	190 47 05.03	10 47 47.26	Skelly.....	4.1154255	13044.44	42796.6
	97 49 37.821	241 33 14.97	61 38 07.14	Welder.....	4.2833117	19222.58	63066.1
Nolan, 1904.....	28 00 22.728	133 45 22.01	313 42 28.19	Mathis.....	4.1452136	13970.55	45835.0
	97 43 27.390	161 13 35.68	341 11 23.69	Skelly.....	4.3764203	23736.70	77876.2
		199 55 54.78	19 57 52.43	Welder.....	4.3010739	20002.02	65023.3
Elliff, 1904.....	27 50 05.924	174 56 14.63	354 55 31.04	Mathis.....	4.4587330	28756.30	94344.6
	97 48 04.058	201 42 26.78	21 44 30.34	Nolan.....	4.3104371	20437.94	67053.5
Reynolds, 1904....	27 55 48.761	213 38 48.52	33 42 10.73	Mathis.....	4.3372287	21738.46	71320.3
	97 56 53.206	249 06 40.74	69 13 07.01	Nolan.....	4.3749601	23711.01	77791.9
		305 48 21.89	125 52 31.69	Elliff.....	4.2568238	18022.86	59130.0
Alice, 1904.....	27 44 33.012	210 44 44.89	30 48 16.27	Reynolds.....	4.3839863	24209.58	79427.4
	98 04 30.885	249 09 49.10	69 17 29.17	Elliff.....	4.4009024	23893.65	94795.2
Wood, 1904.....	27 43 41.237	96 51 10.07	276 47 23.70	Alice.....	4.1276774	13417.68	44021.2
	97 56 24.478	177 38 29.77	357 38 14.02	Reynolds.....	4.3505017	22413.09	73633.6
		229 07 50.78	49 11 44.02	Elliff.....	4.2578739	18108.14	59409.8
Alice east base, 1900.	27 38 40.200	139 28 59.95	319 26 22.42	Alice.....	4.1550244	14289.74	46882.3
	97 58 51.918	203 32 56.84	23 34 05.35	Wood.....	4.0046921	10108.63	33194.7
Alice west base, 1900.	27 38 38.980	107 59 28.12	347 58 48.78	Alice.....	4.0469630	11141.99	36555.0
	98 08 06.241	229 46 18.74	49 49 25.42	Wood.....	4.1587944	14413.33	47291.0
		269 40 11.52	89 42 09.52	Alice east base	3.8433392	9971.7078	32878.010
Rogers, 1905.....	27 46 51.873	108 28 31.04	288 23 25.59	Elliff.....	4.2762474	18890.67	61977.1
	97 37 09.319	157 31 15.98	337 28 19.11	Nolan.....	4.4816279	27016.43	88636.4
Kaleta, 1905.....	27 54 08.160	32 26 47.69	212 24 22.08	Rogers.....	4.2016735	15910.12	52198.5
	97 31 57.540	74 18 51.11	254 11 19.31	Elliff.....	4.4388887	27471.90	90130.7
		121 29 17.49	301 28 54.11	Nolan.....	4.3444413	22102.49	72514.6

Geographic positions—Continued.

SEGUIN TO ALICE, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points.</i>							
Skidmore Methodist Church, spire, 1904-5.	28 15 18.206	345 27 30.1	165 28 09.5	Welder.....	3.956792	9053.0	29701
	97 40 40.752	67 20 08.9	247 16 37.6	Skelly.....	4.120669	13202.9	43317
		112 26 06.5	292 22 27.8	Miller.....	4.133937	13012.5	44660
		157 12 15.6	337 09 32.1	Beeville.....	4.383673	24192.1	79370
	103 40 33.8	343 39 50.2	O'Neill.....	3.950021	8912.9	29242	
Skidmore Catholic Church, spire, 1904-5.	28 15 28.875	345 31 20.9	165 32 01.6	Welder.....	3.972644	9389.5	30805
	97 40 43.477	111 15 35.5	291 11 58.0	Miller.....	4.127794	13421.3	44083
		157 03 46.4	337 01 04.1	Beeville.....	4.377682	23800.6	78283
		163 32 06.9	343 31 24.6	O'Neill.....	3.933332	8576.9	28139
Skidmore Baptist Church, spire, 1904-5.	28 15 12.239	345 16 55.7	165 17 34.8	Welder.....	3.947948	8870.5	29103
	97 40 40.040	68 06 25.3	248 02 53.0	Skelly.....	4.118900	13151.2	43147
		157 19 40.7	337 17 02.8	Beeville.....	4.390837	24309.0	79561
		163 53 01.9	343 52 18.0	O'Neill.....	3.958790	9094.7	29838
Mathis gin stack, 1904.	28 05 41.943	314 22 10.4	134 25 03.2	Nolan.....	4.147544	14045.7	46082
	97 49 34.832	19 06 47.3	199 06 46.3	Mathis.....	2.251212	178.3	585
		33 35 08.9	213 31 40.7	Reynolds.....	4.340664	21911.1	71887
Mathis Methodist Church, spire, 1905.	28 05 39.785	192 05 49.6	12 06 36.7	Skelly.....	4.113967	13000.7	42653
	97 49 47.424	289 46 08.2	109 46 13.1	Mathis.....	2.479684	301.8	990
		313 12 50.4	133 15 49.3	Nolan.....	4.153720	14246.9	46742
McNeill's (P. E.) house, windmill, 1905.	27 59 37.598	217 03 20.1	37 05 53.7	Mathis.....	4.141338	13846.4	45428
	97 54 42.674	265 39 01.1	85 44 18.1	Nolan.....	4.267247	18503.2	60706
		328 11 58.1	148 15 04.7	Elliff.....	4.315956	20699.3	67911
	27 44 56.3	207 43 52.7	Reynolds.....	3.900843	7958.7	26111	
Banquete, Cyrus Elliff's house chimney, 1905. ¹	27 47 40.76	60 31 02	240 27 20	Wood.....	4.175110	14996.1	49101
	97 48 28.85	188 37 46	8 37 58	Elliff.....	3.655082	4519.4	14827
King's ranch house, tallest chimney, 1905. ²	27 50 53.75	5 27 24	185 27 02	Wood.....	4.126252	13373.7	43577
	97 55 38.04	166 26 53	346 25 15	Reynolds.....	3.970432	9341.8	30649
Robstown railway water tank, 1905.	27 47 09.929	111 43 50.9	291 39 58.8	Elliff.....	4.165906	14652.3	48072
	97 39 46.676	224 53 14.4	44 56 53.5	Kaletka.....	4.259594	18180.0	59646
		277 20 28.4	97 21 41.8	Rogers.....	3.637868	4343.8	14251
Wood's ranch house cupola, 1905.	27 45 56.745	77 27 45.9	257 24 29.3	Alice.....	4.073641	11847.9	38871
	97 57 28.605	182 36 40.8	2 36 55.0	Reynolds.....	4.261071	18241.9	59849
		337 09 38.6	157 10 08.5	Wood.....	3.655691	4625.8	14848
Alice, Walters & Co.'s gin stack, 1905.	27 44 47.012	278 08 28.2	98 12 27.0	Wood.....	4.153488	14239.8	46717
	98 04 59.076	318 18 81.1	138 19 21.7	Alice east base.	4.179618	15122.3	49614
		299 10 04.7	119 10 17.8	Alice.....	3.946560	8842.2	29010
Alice spire, 1906..	27 45 02.648	230 49 01.8	100 52 44.0	Wood.....	4.124332	13314.7	43688
	98 04 21.925	322 27 04.7	142 29 38.1	Alice east base.	4.171542	14843.7	48700
		15 03 27.8	195 03 23.7	Alice.....	2.976273	944.6	3099
Parkman's gin stack, 1905. ¹	27 45 10.42	281 25 14	101 29 05	Wood.....	4.140055	13824.7	45357
	98 04 39.19	348 49 40	168 49 44	Alice.....	3.069508	1173.6	3850
Cestohowa church, spire, 1905. ¹	29 00 38.36	264 35 59	84 41 43	Ruckman.....	4.284730	19233.3	63200
	97 56 01.84	352 17 59	172 18 35	Karnes.....	4.173276	14903.1	48895
Panna Maria church, spire, 1905. ¹	28 57 24.89	243 40 19	63 45 00	Ruckman.....	4.243181	17505.8	57434
	97 53 52.94	9 38 05	189 37 38	Karnes.....	3.951264	8938.5	29320
Karnes City courthouse, steeple, 1904.	28 53 05.934	54 06 05.7	224 05 45.1	Karnes.....	3.156239	1432.0	4701
	97 54 05.309	148 34 07.6	328 28 01.6	Serita.....	4.591967	39081.1	128210
		175 34 07.0	355 33 12.0	Stoekdale.....	4.602495	40040.1	131895
		225 31 10.0	45 35 56.7	Ruckman.....	4.351400	22459.5	73886
	355 24 58.2	175 25 19.8	Bryde.....	4.180945	15168.6	49766	
Runge school-house, steeple, 1904.	28 53 17.670	8 18 23.7	183 13 04.8	Choate.....	4.279717	19042.2	62474
	97 42 41.791	89 33 19.1	266 27 28.3	Karnes.....	4.294853	19718.9	64694
		170 51 44.6	350 51 00.4	Ruckman.....	4.192065	15652.0	51056

¹ Checked by vertical angles only.

² No check on this position.

Geographic positions—Continued.

SEGUIN TO ALICE, TEX.—Continued.

Station.	Latitude and longitude.	Azimuth.	Back azimuth.	To station.	Distance.		
					Log (meters).	Meters.	Feet.
<i>Supplementary points—Con.</i>							
	° ' "	° ' "	° ' "				
Runge church, tallest spire, 1904.	28 53 10.300 97 42 44.857	3 03 02.4 87 12 12.6 171 14 32.1	183 02 43.4 267 06 22.9 351 13 49.1	Choate..... Karnes..... Ruokman.....	4.274434 4.203078 4.197977	18812.0 19037.1 15775.8	61710 64426 51756
Jones (Captain) house, tallest cone, 1904.	28 26 02.773 97 45 23.734	335 15 09.1 18 23 28.7 100 19 35.6 145.43 57.6	155 16 40.0 198 22 03.9 280 15 08.3 325 43 28.8	O'Neill..... Miller..... Fleming..... Beeville.....	4.094435 4.188036 4.190924 3.473185	12429.0 15441.4 15521.2 2972.9	40777 50861 50923 9754
Beeville white church, red cone, spire, 1904.	28 24 17.319 97 44 56.770	110 38 41.2 157 06 49.7 330 56 23.6	290 34 01.1 337 06 07.0 150 57 41.6	Fleming..... Beeville..... O'Neill.....	4.233035 3.791734 3.963772	17101.5 6190.6 9199.7	56107 20310 30183
Beeville Catholic Church, spire, 1904.	28 24 24.325 97 44 40.324	27 31 07.8 109 27 57.1 152 30 51.0 334 02 18.1	207 29 22.4 289 23 09.2 332 30 01.0 154 03 28.3	Miller..... Fleming..... Beeville..... O'Neill.....	4.117407 4.241749 3.791408 3.963089	13104.1 17448.1 0186.0 9184.2	42992 57244 20295 30133
Beeville water tower, 1904.	28 24 22.273 97 44 35.790	28 07 29.7 109 31 35.7 151 47 07.5 334 83 50.7	208 05 42.1 289 20 45.0 331 46 15.4 154 34 58.7	Miller..... Fleming..... Beeville..... O'Neill.....	4.117404 4.245182 3.799298 3.957789	13105.8 17585.4 6299.4 9073.8	42998 57695 20267 28770
Beeville Catholic Convent, 1904. ¹	28 24 27.74 97 44 45.37	109 17 19 153 12 38	289 12 33 333 11 51	Fleming..... Beeville.....	4.237037 3.783306	17283.7 6029.8	56705 19753
Clareville gin stack, 1905. ¹	28 19 10.09 97 51 48.27	290 50 04 334 07 51	110 51 42 154 09 35	Miller..... Skelly.....	3.777093 4.189807	5997.8 13797.7	19078 45268

¹ No check on this position.

ELEVATIONS.

The datum for all elevations is mean sea level.

The stations are divided into three classes: Class 1 are those directly connected with sea level by precise levels and subject to a probable error of ± 0.05 meter. Class 2 comprises the stations in the main scheme, the elevations of which are fixed by reciprocal measures of vertical angles and which are subject to probable errors varying from ± 0.1 to ± 0.6 meter. Class 3 includes the intersection stations, the elevations of which are fixed by measurements of vertical angles which are nonreciprocal, the intersection stations not being occupied. These elevations are subject to probable errors which may be as great as 2 meters.

The elevations in class 2 were determined from adjustments made in eight sections. The following table shows the sections. The second column gives for each section the probable error of unit weight, which may be defined as the measure of the accuracy of reciprocal observations over a line 31.7 kilometers (19½ miles) long, the difference in the elevation of the two points being determined with such an accuracy that it is an even chance whether the error is greater or less than the probable error as given. The third column gives the least accurately determined station in the section, and the final column the probable error of the elevation of this station.

Section.	Probable error of unit weight.	Least accurately determined station.	Probable error of least accurately determined station.
	<i>Meters.</i>		<i>Meters.</i>
Anthony base net to Enid-Waukomis.....	±1.09	Vicar.....	±0.59
Waukomis-Garber to Elreno base net.....	±0.59	Edmonds.....	±0.42
Yukon-Carson to Duncan-Arbuckle.....	±0.24	Kechl.....	±0.25
Arbuckle-Duncan to Bowie base net.....	±0.52	Blue.....	±0.32
Bowie base net to Stephenville base net.....	±0.42	Gilbert.....	±0.31
Stephenville base net to Lampasas base net.....	±0.55	Scoggins.....	±0.38
Lampasas to Seguin.....	±0.41	Shovel.....	±0.30
Seguin to Alice.....	±0.88	O'Neill.....	±0.39

Elevations.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
<i>Class 1.</i>				<i>Class 2—Continued.</i>			
Enid.....	Square cut.....	<i>Meters.</i>	<i>Feet.</i>	Table Hill.....	Station mark.....	<i>Meters.</i>	<i>Feet.</i>
Waukomis.....	do.....	385.26	1264.0	Arbuckle or Velma (U. S. G. S.).....	do.....	394.5	1294
Elreno east base.....	Station mark.....	440.19	1444.2	Arbuckle Mountain or Mounds (U. S. G. S.).....	do.....	397.3	1303
Elreno west base.....	do.....	406.93	1331.9	Lone Tree.....	do.....	427.6	1403
Duncan.....	Square cut in concrete.....	373.30	1224.7	Monument.....	do.....	325.7	1069
Marlow longitude station.....	Cross in station mark.....	400.14	1312.8	Benton.....	do.....	329.9	1082
Bowie northwest base.....	Center of mark.....	327.40	1074.3	Grady.....	do.....	301.4	989
Bowie southeast base.....	do.....	333.40	1093.8	Blue.....	do.....	283.0	928
Comanche.....	Station mark.....	374.71	1229.4	Cuba.....	do.....	312.1	1024
Lampasas northeast base.....	Center of mark.....	315.45	1034.9	Queen.....	do.....	298.8	980
Lampasas southwest base.....	do.....	381.59	1251.9	Myers.....	do.....	362.5	1189
Gilmore.....	do.....	392.15	1286.6	Jones.....	do.....	345.3	1133
Rutherford.....	Station mark.....	429.3	1408	Spradling.....	do.....	362.4	1189
Fowler.....	do.....	390.0	1280	Indian.....	do.....	375.7	1233
Miller (1902).....	do.....	414.1	1359	Moore.....	do.....	395.2	1297
Renfrow.....	do.....	373.0	1220	Davis.....	do.....	383.6	1259
Sand Hill.....	do.....	444.4	1458	Woolly.....	do.....	386.5	1268
Vicar.....	do.....	361.9	1187	Kyle.....	do.....	449.7	1476
Hahn.....	do.....	342.4	1123	Gilbert.....	do.....	412.4	1353
McCoy.....	do.....	429.3	1408	Oaks.....	do.....	397.2	1303
Garber.....	do.....	359.9	1181	McClenny.....	do.....	384.8	1098
Mitchell.....	do.....	386.7	1269	Pilot.....	do.....	401.6	1318
Parnell.....	do.....	357.5	1173	Gatlin.....	do.....	425.4	1399
Wingard.....	do.....	351.1	1152	Lone Mountain.....	do.....	452.8	1486
Elchoff.....	do.....	409.4	1343	Young.....	do.....	429.0	1407
Burson.....	do.....	356.5	1170	Alarm.....	do.....	460.1	1510
Edmonds.....	do.....	373.1	1224	Stephenville north base.....	do.....	432.1	1418
Caddo.....	do.....	435.9	1430	Stephenville south base.....	do.....	426.9	1401
Yukon.....	do.....	428.1	1398	Gibson.....	do.....	400.3	1313
Carson.....	do.....	435.5	1429	Gleason.....	do.....	423.0	1386
Smith.....	do.....	408.0	1332	Chambliss.....	do.....	405.9	1332
Lanier.....	do.....	416.0	1365	Scoggins.....	do.....	408.8	1341
Purcell.....	do.....	382.6	1255	Brown.....	do.....	379.9	1246
Kechl.....	do.....	480.6	1577	Kling.....	do.....	448.2	1470
Osaria or Marlow (U. S. G. S.).....	do.....	441.3	1443	Franklin.....	do.....	367.7	1174
				Flat Top.....	do.....	427.1	1401
				Bachelor.....	do.....	466.7	1531
				May.....	do.....	423.7	1390
				Gabriel.....	do.....	466.7	1531
						368.3	1208

Elevations—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
		Meters.	Feet.			Meters.	Feet.
<i>Class 3.</i>				<i>Class 3—Continued.</i>			
Miller eccentric.....	Ground.....	418.7	1357	Hennessey schoolhouse.	Bottom of cupola.	365.7	1200
Section 13, northwest corner.	.....do.....	385.4	1264	Hennessey elevator..	Top.....	370.5	1216
Livingood's house..	Top of chimney.	392.0	1280	Section 29, T. 17 N., R. 7 W., southwest corner. ¹	.....do.....	354.5	1163
First auxiliary.....	Ground.....	382.6	1255	Kingfisher courthouse. ¹	Bottom of dome.	340.4	1117
Boundary stone 160.	Top of stone.	382.2	1254	Kingfisher college ¹ .	Top of dome.	351.8	1154
Red barn.....	Ridge of roof.	391.8	1285	Kingfisher standpipe	Top.....	367.2	1205
Boundary stone 163.	Top of stone.	373.2	1224	Guthrie standpipe.	.....do.....	345.9	1135
Camchester schoolhouse.	Ridge of roof	414.2	1359	Guthrie St. Joseph Church.	Top of east spire.	350.8	1151
Manchester schoolhouse.	.....do.....	398.4	1307	Okarcho Catholic Church.	Ridge of roof	383.6	1259
Quarter section corner, sections 25 and 36. ¹	Stone.....	428.0	1404	Okarcho elevator, center top.	.....do.....	395.5	1298
Sand Hill reference mark.	Top.....	428.6	1406	Edmonds college....	Top of dome.	396.4	1301
Wakita low elevator.	.....do.....	369.1	1211	Caddo schoolhouse, water tank.	Top.....	448.2	1470
Wakita high elevator	.....do.....	372.8	1223	Darlington water tank.	Top of cylinder.	431.9	1417
Wakita church.....	Ridge of roof.	365.2	1198	Fort Reno high water tank.	Top.....	445.7	1462
Renfrow Christian Church.	Top of spire.	385.6	1265	Fort Reno low water tank. ¹	.....do.....	440.4	1445
Renfrow low elevator	Top.....	381.8	1253	Elreno standpipe....	.....do.....	460.5	1511
Renfrow high elevator.	.....do.....	385.6	1265	Elreno Kerfoot hotel	Bottom of cupola.	432.1	1418
Medford schoolhouse	Center of dome.	349.8	1148	Elreno Catholic Church.	Bottom of spire.	428.1	1405
Numa elevator.....	Ridge of shaft.	352.2	1156	Elreno fire department.	Bottom of boiler.	432.0	1417
Antioch Church ¹	Top of spire.	353.6	1160	Elreno Canadian Milling Co.'s elevator.	Ridge of roof	443.6	1455
Pond Creek schoolhouse.	Top of dome.	339.1	1113	Midland schoolhouse	.....do.....	445.3	1461
Pond Creek roller mill, east cupola.	Top.....	336.2	1103	Oklahoma City church, highest spire.	Top of spire.	396.9	1302
Pond Creek standpipe. ¹	Bottom of tank.	348.5	1143	House with square roof.	Top of north chimney.	390.1	1280
Kremlin schoolhouse	Bottom of cupola.	352.1	1155	Union Catholic Church.	Ridge of roof	414.3	1359
Kremlin elevator, east gable.	Top.....	357.8	1174	Union red elevator..	Top.....	417.5	1370
Garber elevator, center shaft.	Ridge of roof	374.9	1230	Minco, Elmata Bond College.	Bottom of cupola.	410.5	1347
Garber church, white spire.	Top of spire.	372.4	1222	Minco red elevator..	Top.....	417.8	1371
Cropper east elevator	Ridge of roof	374.6	1229	Quarter section corner, sections 6 and 8. ¹	.....do.....	421.3	1382
Brokenridge M. E. Church.	.....do.....	379.6	1245	Moore elevator.....	Ridge of roof	398.9	1309
Brokenridge highest elevator.	.....do.....	381.3	1251	Marlow secondary... ¹	Station mark	427.5	1403
North Enid Congregational Church.	.....do.....	395.0	1296	Boundary mile 45 ¹ .	Top of post..	386.8	1269
Enid schoolhouse ¹ ..	Bottom of spire.	394.5	1294	Marlow Baptist Church.	Bottom of spire.	406.6	1334
Enid Catholic Church.	.....do.....	391.4	1284	Marlow Methodist Church.	Top of spire.	410.4	1346
Enidloe plant, stack.	Top of stack.	403.0	1322	Nocona Baptist Church.	Ridge of roof	313.2	1028
Enid Big Four elevator.	Top.....	397.1	1303	Nocona schoolhouse.	.....do.....	315.8	1036
Waukomis schoolhouse.	Bottom of cupola.	398.6	1308	Ringgold Presbyterian Church.	Top of tower	289.6	950
Bison highest elevator, center shaft.	Top.....	393.0	1289	Henrietta courthouse	.....do.....	311.8	1023
Bison low elevator...	.....do.....	391.1	1283	Henrietta schoolhouse.	.....do.....	297.4	976
Hennessey roller mill, stack. ¹	Top of stack.	372.0	1220	Henrietta standpipe.	Top.....	311.7	1028
Hennessey windmill.	Center of wheel.	371.2	1218	House, 5 miles southeast of Henrietta.	Ridge of roof	302.7	993

¹ No check on this elevation.

Elevations—Continued.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.—Continued.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
		Meters.	Feet.			Meters.	Feet.
<i>Class 3—Continued.</i>				<i>Class 3—Continued.</i>			
House, east of Grady	Ridge of roof	285.8	938	Lingleville school-house.	Top of cupola.	493.8	1620
House on ridge, north chimney.	Top of chimney.	317.7	1042	Stephenville court-house.	Top of spire	423.7	1390
Bellevue, Webb's house.	Peak of cupola.	336.3	1103	Stephenville oil mill.	Top of stack.	416.1	1365
Bellevue, Methodist Church. ¹	East gable...	345.7	1134	Stephenville, Tarleton College.	Top of conical tower.	423.6	1390
Bellevue, Orton's windmill.	Center of wheel.	333.3	1094	Do.....	Top of roof..	413.6	1357
Bowdecker's windmill.	.....do.....	340.8	1118	Long House, north center chimney.	Top of chimney.	448.6	1472
Bowie National hotel	Lower edge of conical roof of tower.	365.5	1199	Johnsville cotton gin.	Top of stack.	395.0	1296
Bowie Methodist Church.	Ridge of roof	359.3	1179	Dublin standpipe...	Top.....	477.1	1565
Bowie standpipe....	Top.....	333.3	1258	Dublin high school..	Ridge of roof	475.2	1559
Chico Church with open spire.	Ridge of roof	338.1	1109	Dublin church.....	.....do.....	466.1	1520
Chico Church with square-top spire.	.....do.....	338.8	1112	Dublin oil mill.....	Top of tower	470.7	1544
Jacksboro court-house.	.....do.....	349.0	1145	Purves schoolhouse..	Top of roof..	445.8	1463
Jacksboro jail.....	Top of spire.	339.6	1114	Purves cotton gin... ¹	Top of stack.	450.5	1478
Old Chimney, northwest of Joplin.	Top of chimney.	372.5	1222	Carleton cotton gin. ¹	.....do.....	429.0	1407
Agnes highest windmill.	Center of wheel.	387.0	1270	Olin cotton gin.....	.....do.....	421.3	1382
Agnes schoolhouse..	Ridge of roof	357.1	1270	White church, southeast of Chambliss.	Ridge of roof	377.1	1237
Weatherford white house. ¹	Bottom of cupola.	367.4	1205	Copperas Cove church. ¹	Top of spire.	342.0	1122
Weatherford yellow house.	.....do.....	358.2	1175	Copperas Cove schoolhouse.	Top of roof..	343.2	1126
Weatherford tank near white house. ¹	Top of tank.	368.4	1209	Waters Mountain (U. S. G. S.).	Station mark	486.8	1597
Lingleville open belfry.	Top of belfry.	489.6	1606	Lampasas court-house.	Top of dome.	334.7	1098
				Lampasas spring-house.	Top of cupola.	334.9	1099
				Lampasas school-house.	.....do.....	335.8	1102
				Lampasas First Baptist Church, spire.	Top of pyramid.	343.8	1128

LAMPASAS TO SEGUIN, TEX.

<i>Class 1.</i>				<i>Class 2—Continued.</i>			
Barton.....	Station mark	315.70	1035.8	Buzzard.....	Station mark	432.0	1417
Seguin east base.....	.....do.....	181.87	598.7	Carpenter.....	.....do.....	270.1	886
Seguin west base.....	.....do.....	189.09	620.4	Krueger.....	.....do.....	308.8	997
<i>Class 2.</i>				<i>Class 3.</i>			
Travis.....	.....do.....	395.6	1298	Austin, Capitol.....	Star in hand of Liberty.	259.0	850
Shovel.....	.....do.....	470.0	1542	Bertram Railroad windmill.	Center of wheel.	398.4	1307
Shingle.....	.....do.....	431.7	1416	Bertram Methodist Church spire.	Top of cone.	400.0	1312
Cedar.....	.....do.....	355.2	1165	Austin Colored Asylum.	Top of stand-pipe.	221.4	726
Loneman.....	.....do.....	433.3	1422	Austin Colored Asylum.	Dome at south end.	215.3	706
Hugo.....	.....do.....	401.6	1318	Hornbortel's gin....	Top of stack.	174.9	574
Gus.....	.....do.....	322.9	1059	New Braunfels Catholic Church.	Top of spire.	230.0	755
Bear.....	.....do.....	304.5	1198	New Braunfels spire, square massive base, slim cone, silver ball on top.	Top.....	223.0	732
Mission.....	.....do.....	295.8	970				
Tiken.....	.....do.....	230.9	725				
Mott.....	.....do.....	177.3	582				
Herndon.....	.....do.....	214.4	703				
Central.....	.....do.....	201.3	660				
Thomas.....	.....do.....	227.4	746				
Lavernia.....	.....do.....	237.8	780				
Post.....	.....do.....	471.1	1548				

¹ No check on this elevation.

Elevations—Continued.

LAMPASAS TO SEGUIN, TEX.—Continued.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
		Meters.	Feet.			Meters.	Feet.
<i>Class 5—Continued.</i>				<i>Class 5—Continued.</i>			
New Braunfels courthouse.	Top of tower	216.9	712	Seguin schoolhouse, quite high spire, short tower, two collars.	Top of spire.	182.9	600
New Braunfels standpipe.	Top.....	224.1	735	Seguin courthouse...	Spira.....	184.0	604
Kingsbury, tall stack with cross. ¹	Top.....	202.5	664	Seguin standpipe....	.....	191.1	627
Church, red spire, north end of building.	Top of cone..	187.5	615	Seguin, Zanke's cotton gin.	Top of tall brick smoke-stack.	183.3	601
Round tank, light colored.	Top.....	174.9	574	Seguin cotton compress building.	Top.....	183.1	601
Marion Lutheran Church.	Top of spire.	209.8	688	Seguin Milling & Power Co.	Top of water tank.	183.6	602
Marion, Schultz & Dreyer's cotton gin.	Top of smoke-stack.	211.3	693	Seguin Catholic Church, high, sharp spire.	Point of cone	178.5	586
Seguin oil factory...	Top of tall water tower.	193.7	635	Steins church.....	Spira.....	193.7	635
				St. Hedwig Catholic Church.	Top of heavy stone tower.	202.7	665

SEGUIN TO ALICE, TEX.

<i>Class 2.</i>				<i>Class 3—Continued.</i>			
Serita.....	Station mark.	180.68	592.8	Skidmore Catholic Church spire.	Top of cone..	62.0	203
Stockdale.....	do	170.45	559.2	Skidmore Methodist Church spire.	.....do.....	61.8	203
Ruckman.....	do	147.14	482.7	Skidmore Baptist Church spire. ¹	Top of tallest building.	62.9	206
Karnes.....	do	140.63	461.4	Clareville gin stack (tall).	Top.....	96.1	315
Bryde.....	do	159.39	522.9	Captain Jones's house. ¹	Tallest cone.	99.9	328
Choate.....	do	126.82	416.1	Mathis Methodist Church spire.	Top of cone..	62.4	205
Pettus.....	do	136.10	446.5	Mathis gin stack....	Top.....	62.9	206
Borroum.....	do	147.92	485.3	P. E. McNeill's windmill.	Center of wheel.	71.0	233
Wiss.....	do	109.73	360.0	Banquete, Cyrus Elliff's house.	Top of chimney.	40.0	131
Beeville.....	do	100.78	330.6	Wood's ranch house.	Top of cupola.	54.8	180
Fleming.....	do	183.12	436.7	King's ranch house..	Tallest chimney.	49.4	162
Miller (1904).....	do	72.31	237.2	King's ranch house..	Top.....	46.0	151
O'Neill.....	do	58.10	190.6	Alice, Walters & Co.'s gin stack.	.....do.....	78.1	256
Skelly.....	do	64.60	211.9	Alice spire.....	.....do.....	76.9	252
Welder.....	do	33.48	109.8	Cestohowa church spire.	Top of cone..	119.6	392
Mathis.....	do	48.74	159.9	Panna Maria church spire.	Top.....	123.9	406
Nolan.....	do	32.21	105.7	Parkman's gin stack.	.....do.....	76.2	250
Elliff.....	do	31.07	101.9	Robstown, railway water tank.	.....do.....	32.9	108
Rogers.....	do	19.28	63.3				
Kaletka.....	do	21.91	71.9				
Reynolds.....	do	57.31	189.0				
Wood.....	do	40.46	132.7				
Alice.....	do	62.00	206.4				
Alice east base.....	do	42.31	138.8				
Alice west base.....	do	51.75	169.8				
<i>Class 3.</i>							
Karnes City courthouse.	Top of steeple.	158.4	520				
Runge church.....	Tallest spire.	122.2	401				
Beeville water tower.	Top.....	92.5	303				
Beeville Catholic Church spire.	Top of cone..	91.7	301				

¹ No check on this elevation.

DESCRIPTION OF STATIONS.

This list 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.

The distances between the station and reference marks, as given in the descriptions, are horizontal unless otherwise stated.

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

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

GENERAL NOTES IN REGARD TO STATION MARKS.

Note 1.—The station is marked by a nail set in concrete in the center of a terra-cotta pipe, 4 inches in diameter and 2 feet long, filled with concrete and set in a block of concrete 18 inches in diameter. The underground mark set 2 feet below the surface is similar, except that the concrete surrounding the terra-cotta pipe is 1 foot in diameter. The reference mark is a nail set in concrete in the center of a terra-cotta pipe filled with concrete and set in a block of concrete 1 foot in diameter.

Note 2.—The station is marked by an old-style bronze station mark, set in a hard limestone block 23 inches square and 16 inches high, which is in turn embedded in a block of concrete 4 feet square by 4 feet deep. The underground mark is a millimeter hole in the top of a copper bolt set in a limestone block 6 inches square by 1 foot long, which in turn is set in concrete with its top 4 feet below the surface. Between the bottom of the limestone block at the surface and the underground mark is a terra-cotta pipe 7 inches in diameter and 25 inches long, partly embedded in the upper mass of concrete and covered with a piece of galvanized iron to prevent anything from falling on the underground mark.

Note 3.—The station is marked by a nail set in the center of an iron pipe, 2 inches in diameter and 2 feet long, set flange down, filled with concrete and surrounded by a block of concrete 18 inches in diameter. The concrete is marked with the letters U. S. C. & G. S., and with the date. The underground mark is the same except that the concrete block is only 12 inches in diameter. The reference mark is the same as the underground mark.

Note 4.—The surface and reference marks are the same as described in note 3. The underground mark is a nail set in concrete in solid rock.

Note 5.—The surface and underground marks are the same as described in note 4. The reference mark is a $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch drill hole, 1 to 2 inches deep, surrounded by a triangle.

OKLAHOMA-KANSAS BOUNDARY TO LAMPASAS, TEX.

Principal points.

Rutherford (Harper County, Kans., A. T. Mosman, 1901; 1902).—In NW. $\frac{1}{4}$ sec. 29, T. 33 S., R. 7 W., about 400 yards east and 250 yards south of the northwest corner of the section, about $4\frac{1}{2}$ miles west of Anthony, on land belonging to a mortgage company and rented by Mr. Rutherford who lives 1 mile south of the station. The station is marked with an old-style bronze station mark set in a 6-inch drain tile 2 feet long, filled with concrete and buried with the flange end flush with the surface of the

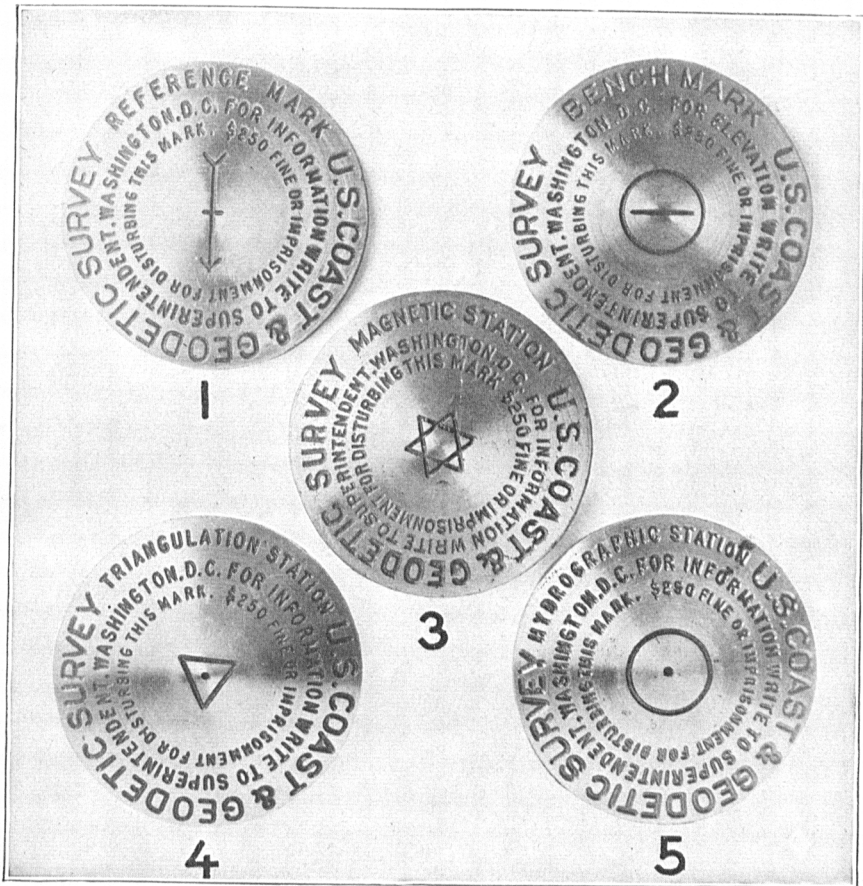


FIG. 1.—STANDARD MARKS OF THE U. S. COAST AND GEODETIC SURVEY.

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

ground. The underground mark is a bottle encased in concrete and buried with the mouth from $2\frac{1}{2}$ to 4 feet below the surface. Witness marks were set from $4\frac{1}{2}$ to 7 feet north and south of the station and consist of a nail in the top of a 4-inch drain tile filled with concrete and buried with the top flush with the ground.

Miller (Harper County, Kans., W. Bowie, 1902).—In sec. 36, T. 34 S., R. 6 W., on a low ridge of land belonging to George Miller and 22 meters north of the northwest corner of his house. The station is marked according to note 1, and the reference mark is distant 202.509 meters (664.40 feet) in azimuth $3^{\circ} 32' 2''$. The corner of sections 35, 36, 1, and 2 is distant 210.22 meters (689.70 feet) in azimuth $6^{\circ} 08' 6''$.

Fowler (Harper County, Kans., W. Bowie, 1902).—About $3\frac{1}{4}$ miles east and 3 miles north from Bluff City, on land owned by S. P. Joyner, in SW. $\frac{1}{4}$ sec. 36, T. 33 S., R. 5 W. The station is marked according to note 1. The reference mark, set in the corner of a field, 0.35 meter north of the north road fence and 0.70 meter west of the north and south fence along the west side of Mr. Joyner's dooryard, is 193.294 meters (634.17 feet) from the station in azimuth $348^{\circ} 17' 2''$. The distances and azimuths to certain other points are: Stone at southwest corner of the section, 562.98 meters, $68^{\circ} 27' 8''$; chimney of main house of Mr. Joyner, about 300 meters, $329^{\circ} 57' 7''$; shaft of windmill at north roadside, about 190 meters, $353^{\circ} 48' 9''$.

Renfrow (Grant County, Okla., O. W. Ferguson, 1902).—In the southeast corner of NW. $\frac{1}{4}$ sec. 14, T. 28 N., R. 5 W., 91.40 meters (299.9 feet) north of east-and-west fence and 82.78 meters (271.6 feet) west of north-and-south fence, on land of Tony Tucker. The station is marked according to note 1. The reference mark is 0.60 meter (2.0 feet) west of north-and-south fence, and 0.77 meter (2.5 feet) north of east-and-west fence, 121.770 meters (399.51 feet) from the station in azimuth $317^{\circ} 31' 21''$. Other distances and azimuths are as follows: Southeast corner of sec. 14, 1257.7 meters (4126 feet), $315^{\circ} 13' 30''$; Mr. Zimmerman's house, center chimney, $\frac{5}{8}$ mile, $254^{\circ} 49' 04''$; Elmer Behann's house, center chimney, $\frac{3}{8}$ mile, $286^{\circ} 48' 53''$; Richland schoolhouse, belfry, $\frac{5}{8}$ mile, $318^{\circ} 17' 11''$.

Sand Hill (Woods County, Okla., W. Bowie, 1902).—In SW. $\frac{1}{4}$ sec. 25, T. 28 N., R. 9 W., about $9\frac{1}{2}$ miles south and $4\frac{1}{2}$ miles west of Manchester, on the north edge of what are known as the Sand Hills. The station is marked according to note 1. The reference mark is in the fence corner south of the quarter-section stone common to sections 25 and 36, 536.00 meters (1758.5 feet) from the station in azimuth $352^{\circ} 47' 11''$. The distance and azimuth to the quarter-section corner are, respectively, 525.75 meters (1724.9 feet), $352^{\circ} 19' 24''$.

Vicar (Grant County, Okla., W. Bowie, 1902).—In NE. $\frac{1}{4}$ sec. 1, T. 25 N., R. 7 W., 5 miles west and $\frac{1}{2}$ mile north of Pond Creek, on the highest point of a low ridge running about east and west, on property of J. F. Vickers. The station is marked according to note 1. The reference mark is near the quarter-section corner common to sections 1 of R. 7 W. and 6 of R. 6 W., 261.82 meters (859.0 feet) from the station in azimuth $301^{\circ} 58' 34''$. The distance and azimuth to a cedar post at the corner of ranges 6 and 7, townships 25 and 26, are, respectively, 700.4 meters (2298 feet), $198^{\circ} 19' 08''$.

Hahn (Garfield County, Okla., O. W. Ferguson, 1902).—In sec. 3, T. 24 N., R. 4 W., on land of J. K. Myers, 240.9 meters (790 feet) north of the south line of the section, 15.85 meters (52.0 feet) east of the line of hedge on the west side of road, and 0.11 meter (0.4 foot) west of a line of posts on the east side of road. The station is marked according to note 1. The reference mark is just within the field at the southwest corner of sec. 3, 0.85 meter (2.8 feet) east of road fence and 0.94 meter (3.1 feet) north of east-and-west fence, 232.694 meters (763.43 feet) from the station in azimuth $359^{\circ} 49' 49''$. Other distances and azimuths are as follows: Stone marking southwest corner of sec. 3, 240.92 meters (790.4 feet), $1^{\circ} 45' 21''$; tower of J. A. Meikles's windmill, $\frac{3}{8}$ mile, $7^{\circ} 36' 30''$; J. K. Myers's windmill, 1 mile, $275^{\circ} 31' 26''$; tower of A. J. Hahn's windmill, $\frac{3}{8}$ mile, $73^{\circ} 46' 57''$.

McCoy (Garfield County, Okla., W. Bowie, 1902).—About $12\frac{1}{2}$ miles west and $\frac{3}{4}$ mile south of Kremlin, in SE. $\frac{1}{4}$ sec. 21, T. 24 N., R. 8 W., on the highest point of land on property of A. S. McCoy. The station is marked according to note 1. The reference mark is in the fence corner on the south side of the road, opposite the quarter-section corner common to sections 21 and 23, 409.97 meters (1345.0 feet) from the station in azimuth $17^{\circ} 36' 15''$.

Enid (Garfield County, Okla., W. Bowie, 1902).—In sec. 22, T. 23 N., R. 6 W., in the line of fence on the south side of a road, on the property of Mr. Smith. The station is marked according to note 1. The reference mark is in the northeast corner of Mr. Smith's property and very near the section corner, 66.166 meters (217.08 feet) from the station in azimuth $271^{\circ} 29' 20''$. The section corner common to sec. 14, 15, 22, and 23, is 76.318 meters (250.39 feet) from the station in azimuth $264^{\circ} 28' 20''$.

Garber (Garfield County, Okla., O. W. Ferguson, 1902).—At the northeast edge of the town of Garber, in sec. 25, T. 23 N., R. 4 W., on land of the Chicago, Rock Island & Pacific Railway, 28.05 meters (92.0 feet) north from the center of the track, 2.37 meters (7.8 feet) south of a wire fence on the railroad right-of-way line, 68.40 meters (224.4 feet) from the northwest corner of a cattle pen, and 75.46 meters (247.6 feet) from the center of the track at a switch block. The station is marked according to note 3. The reference mark is west of the station, opposite the east window in the north face of the depot, 252.176 meters (827.35 feet) from the station in azimuth $90^{\circ} 40' 37''$. Other distances and azimuths are as follows: Center of section, 201.33 meters (660.5 feet), $272^{\circ} 37' 06''$; Mr. Schieber's chimney, center of square-topped house, 175 meters, $8^{\circ} 06' 55''$; M. E. church spire, 275 meters, $15^{\circ} 38' 54''$; center of large elevator, 85 meters, $60^{\circ} 37' 26''$.

Mitchell (Garfield County, Okla., O. W. Ferguson, 1902).—About $1\frac{1}{2}$ miles south and 1 mile east of Ladysmith, in sec. 2, T. 20 N., R. 3 W., 78.8 meters (259 feet) west of the east end of the half-section line. The land north of the station is owned by T. J. Mitchell. The station is marked according to note 3. The reference mark is on the west side of the north-and-south road between sections 1 and 2, 70.052 meters (229.83 feet) from the station in azimuth $269^{\circ} 44' 34''$. Other distances and azimuths are as follows: Chimney of Mr. Mitchell's house, $\frac{1}{2}$ mile, $139^{\circ} 54' 27''$; chimney of the main part of Fred Frank's house, 1 mile, $291^{\circ} 08' 18''$; chimney of the main part of A. Smith's house, 1 mile, $52^{\circ} 19' 53''$.

Waukomis (Garfield County, Okla., W. Bowie, 1902).—In sec. 23, T. 21 N., R. 7 W., 100 yards northwest of Waukomis, on the property of J. Crick. The station is marked according to note 1. The reference mark is in the northeast corner of Mr. Crick's garden, by the public road, 210.050 meters (689.14 feet) from the station in azimuth $284^{\circ} 08' 01''$.

Parnell (Kingfisher County, Okla., W. Bowie, 1902).—About 6 miles east and $\frac{1}{2}$ mile south of Hennessey, in T. 19 N., R. 6 W., 75 yards east of the corner common to sections 22, 23, 26, and 27, in the fence line on the south side of the road, on the property of B. H. Parnell. The station is marked according to note 1. The reference mark is in the northwest corner of the land of Mr. Parnell, 66.156 meters (217.05 feet) from the station in azimuth $90^{\circ} 04' 12''$.

Wingard (Logan County, Okla., O. W. Ferguson, 1902).—About 5 miles north and $3\frac{3}{4}$ miles west of Guthrie, in SW. $\frac{1}{4}$ sec. 14, T. 17 N., R. 3 W., on the highest ground of the property of J. B. Wingard, on gently sloping cultivated land. The station is marked according to note 1. The reference mark is in the southwest quarter very near the center of the section, 0.94 meter (3.1 feet) south of an east-and-west fence, 0.50 meter (1.6 feet) west of a north-and-south fence, and 329.096 meters (1079.71 feet) from the station in azimuth $194^{\circ} 42' 03''$. Other distances and azimuths are as follows: Corner stone of quarter-section, between sections 14 and 23, 490.9 meters (1611 feet), $2^{\circ} 04' 56''$; east end of the ridge of James Dodd's house, $\frac{3}{4}$ mile, $56^{\circ} 05' 36''$; chimney in center of square-roofed house of William Dodd, $\frac{3}{4}$ mile, $67^{\circ} 57' 18''$; the south end of the ridge of John Gooch's house, $\frac{3}{4}$ mile, $121^{\circ} 30' 15''$.

Burson (Kingfisher County, Okla., W. Bowie, 1902).—About 5 miles north and 2 miles west of Kingfisher, in NE. $\frac{1}{4}$ sec. 29, T. 17 N., R. 7 W., on the property of Isaac Burson. The station is marked according to note 1. The reference mark is in the northwest corner of the school lot, 427.66 meters (1403.1 feet) from the station in azimuth $246^{\circ} 22' 58''$. The southwest corner of section 29, is 1817.3 meters (5962 feet) from the station in azimuth $37^{\circ} 25' 23''$.

Eichoff (Canadian County, Okla., O. W. Ferguson, 1902).—About 4 miles north and 2 miles west of Mathewson, on the section line between secs. 8 and 17, T. 14 N., R. 6 W., about 315 yards west of the east corner, on the land of Gustave Thelan, on the highest ground in the vicinity, 9.75 meters (32 feet) north of the fence line along the south side of the road. The station is marked according to note 1. The reference mark is in a field at the northeast corner of section 17, 0.48 meter (1.6 feet) south of an east-and-west fence, 0.3 meter (1 foot) west of a north-and-south fence, and 279.835 meters (918.09 feet) from the station in azimuth $272^{\circ} 43' 40''$. The east chimney of Mr. Thelan's house is about 1000 yards from the station in azimuth $351^{\circ} 06' 18''$. The southeast corner of section 17 is in azimuth $349^{\circ} 29' 10''$.

Edmonds (Oklahoma County, Okla., O. W. Ferguson, 1902).—At the northeast outskirts of the village of Edmonds, near the middle of sec. 25, T. 14 N., R. 3 W., on the land of Pete Wilderson, at the east edge of cultivated land, about 100 yards north-northeast of the highest ground, and 119.60 meters (392.4 feet) south of the east-and-west fence running to the section corner. The station is marked according to note 1. The reference mark is in the north-and-south fence, 79.402 meters (260.50 feet) from the station in azimuth $263^{\circ} 11' 39''$. Other distances and azimuths are as follows:

Quarter corner in the middle of section 25, 334.83 meters (1098.5 feet), $110^{\circ} 42' 53''$; center of dome of Territorial Normal College, 700 yards, $70^{\circ} 54' 34''$; cross on-spire of Catholic Church, $63^{\circ} 29' 32''$.

Caddo (Canadian County, Okla., W. Bowie, 1902).—About 7 miles from El Reno, in a direction a little west of north, in sec. 17, T. 13 N., R. 7 W., on the highest point of land in the Cayenne Indian school reservation, about 650 yards from the school building. The station is marked according to note 1. The reference mark is located on a sand dune at the edge of some woods, 295.4 meters (969 feet) from the station in azimuth $148^{\circ} 08' 06''$.

Yukon (Canadian County, Okla., O. W. Ferguson, 1902).—About $12\frac{1}{8}$ miles west of Oklahoma City, $1\frac{1}{8}$ miles south and $\frac{1}{2}$ mile west of the school building at Yukon, in SW. $\frac{1}{4}$ sec. 29, T. 12 N., R. 5 W., on the highest ground in the vicinity, on land of John Olive, about 25 yards west of the north-and-south center line through the southwest 40 acres of the southwest quarter. The station is marked according to note 1. The reference mark is 194.677 meters (638.70 feet) from the station in azimuth $2^{\circ} 16' 45''$. Other azimuths and distances are: Center of the north gable of Mrs. Art's house, 243.18 meters (797.8 feet), $14^{\circ} 36' 45''$; north gable of A. Well's house, $296^{\circ} 02' 14''$; south gable of Mr. Olive's house, $131^{\circ} 28' 40''$; center chimney of George Thompson's house, $141^{\circ} 41' 21''$; southwest corner of section 29, 417.3 meters (1369 feet), $81^{\circ} 22' 01''$.

Smith (Oklahoma County, Okla., O. W. Ferguson, 1902; 1921).—About $6\frac{1}{2}$ miles south and 1 mile east of Oklahoma City, 3 miles north and $\frac{1}{4}$ mile west of Moore, in the SE. $\frac{1}{4}$ sec. 34, T. 11 N., R. 3 W., on land of N. H. Smith, at the fence line on the west side of the highway. The station is marked according to note 1. The reference mark is on the west side of the road, just north of the driveway to Smith's house, 1.02 meters (3.3 feet) north of a line of black locust trees, 0.71 meter (2.3 feet) east of a wire fence on the west side of the road, 130.154 meters (427.01 feet) from the station in azimuth $178^{\circ} 44' 35''$. Other distances and azimuths are as follows: To the south gable of the main part of Smith's house, 101.22 meters (332.1 feet), $166^{\circ} 23' 30''$; to the corner common to sections 2, 3, 34, and 35, 406.10 meters (1332.3 feet), $357^{\circ} 56' 28''$.

Carson (Grady County, Okla., W. Bowie, 1902; 1921).—About 3 miles south and 1 mile west of Minco, in sec. 8, T. 9 N., R. 7 W., on the property of Kit Carson, on the highest point of a ridge $\frac{3}{4}$ mile west of the Chicago, Rock Island & Pacific Railway. The station is marked according to note 1. The reference mark is near the fence line north of the station, 275.776 meters (904.78 feet) from the station in azimuth $179^{\circ} 42' 36''$. Other distances and azimuths are as follows: Old boundary mark of Oklahoma-Indian Territory boundary line, 398.2 meters (1306 feet), $151^{\circ} 10' 47''$; quarter-section stone common to sections 5 and 8, 410.3 meters (1346 feet), $150^{\circ} 29' 12''$. The old boundary mark is an 8-inch cottonwood post with top squared, projecting 3 or 4 feet above the ground, and surrounded by a mound of earth.

Elreno east base (Canadian County, Okla., A. L. Baldwin, 1900; 1902).—In sec. 9, T. 11 N., R. 7 W., on the land of G. L. Newman. The station is marked according to note 2 except that the surface block is of red sandstone. The reference mark is a 60-penny wire nail set in the top of a 4-inch terra-cotta pipe, which is filled with and set in concrete. It is in the northeast corner of Mr. Newman's peach orchard, on the west side of the public road, 277.20 meters (909.4 feet) from the station in azimuth $270^{\circ} 46' 22''$. The section corner common to sections 9, 10, 15, and 16 is 1056.8 meters (3467 feet) from the station in azimuth $344^{\circ} 37' 51''$.

Elreno west base (Canadian County, Okla., A. L. Baldwin, 1900; 1902).—About $2\frac{1}{2}$ miles south and $6\frac{3}{4}$ miles west of the Rock Island depot in Elreno, on the land of J. T. Seawell, on the summit of a prominent hill. The station is marked according to note 2, except that the surface block is of red sandstone. The reference mark is a 60-penny wire nail set in the top of a 4-inch terra-cotta pipe, which is filled with and set in concrete. It is 226.731 meters (743.86 feet) from the station in azimuth $114^{\circ} 25' 59''$.

Lanier (McClain County, Okla., W. Bowie, 1902).—In sec. 19, T. 7 N., R. 4 W., on the highest point of a prominent ridge on which are some scattered blackjack oak trees. The station is marked according to note 1. The reference mark is placed within a few meters of three large oak trees, on each of which is cut a triangle on the side facing the mark. It is 136.408 meters (447.53 feet) from the station in azimuth $327^{\circ} 17' 56''$.

Purcell (McClain County, Okla., U. S. G. S. and O. W. Ferguson, 1902; 1920).—About 5 miles west of Purcell, on the land of J. E. Givens, 1 mile north of the Purcell-Chickasha road. The station is marked by a standard bronze tablet set in concrete, and the underground mark is a nail in the top of a 4-inch terra-cotta pipe, which is filled with and set in concrete. The reference mark is a standard bronze tablet set in concrete, 11.06 meters (36.3 feet) from the station in azimuth $261^{\circ} 42'$. The half-

section corner stone between sec. 7 and 8, T. 6 N., R. 2 W., is distant 589.27 meters (1933.3 feet) in azimuth $299^{\circ} 07' 32''$, and the water tank at Purcell is in azimuth $265^{\circ} 32' 39''$.

Table Hill (Garvin County, Okla., U. S. G. S. and O. W. Ferguson, 1902; 1920).—About $4\frac{1}{2}$ miles north of the village of Foster, and 2 miles S. 80° W. of the highest and most tablelike of the hills locally known as the Table Hills, about 600 yards east of a wagon road, and on a timbered tract of land owned by John W. Hunter. The station is marked by a standard bronze tablet set in concrete and the underground mark is a nail in the top of a 4-inch terra-cotta pipe, which is filled with and set in concrete. The reference mark is a standard bronze tablet set in concrete, 33.69 meters (110.5 feet) from the station in azimuth $187^{\circ} 05'$. Other distances and azimuths are as follows: Corner stone common to secs. 2, 3, 10, and 11, T. 2 N., R. 3 E., 597 meters (1959 feet), $339^{\circ} 41'$; water tank at Paulo Valley, $253^{\circ} 21' 33''$; an old stone chimney, $\frac{1}{2}$ mile north, $186^{\circ} 13' 59''$.

Osaria or Marlow (U. S. G. S.) (Garvin County, Okla., W. Bowie, 1902).—Reported lost in 1919.

Kechi (Caddo County, Okla., W. Bowie, 1902; 1921).—In sec. 3, T. 5 N., R. 9 E., on the town site of Cement, about $\frac{1}{2}$ mile east of a branch of the St. Louis-San Francisco Railway extending from Chickasha to Lawton, on a prominent rocky peak among what are known as Kechi Hills. The station is marked by a bronze tablet cemented into a drill hole in the rock. The reference mark is a standard bronze tablet set in concrete, 23.60 meters (77.4 feet) from the station in azimuth $337^{\circ} 25' 38''$.

Arbuckle or Velma (U. S. G. S.) (Stephens County, Okla., O. W. Ferguson, 1902).—About 9 miles north from the village of Loco, 2 miles S. 19° W. from the town of Velma, on the northwest quarter of a high, timbered, rocky ridge, 75 yards south of the wire fence on the south side of a tract leased by J. B. Frensey and J. M. Fitzhugh. The station is the U. S. Geological Survey Station "Velma." The mark (a stone 15 by 10 by 12 inches) had been disturbed. The station was recovered and marked as follows: A hole 2 feet in diameter was dug 20 inches deep in rock and clay, and continued 6 inches farther with a diameter of 6 inches. The lower hole was filled with cement, in which was set a 60-penny wire nail for the underground mark. Over this 5 inches of sand then the U. S. Geological Survey stone previously described were placed. A cross in the center of a bolt in this stone is the surface mark. The stone was embodied in concrete, and the concrete was marked "U. S. C. and G. S., 1902." The reference mark is 0.46 meter (1.5 feet) south of Frensey's and Fitzhugh's south fence, 77.210 meters (253.3 feet) from the station in azimuth $239^{\circ} 27' 20''$. Other distances and azimuths are: Corner stone common to secs. 25, 26, 35, and 36, T. 1 S., R. 5 W., 82.65 meters (271.2 feet), $238^{\circ} 12' 24''$; north end of ridge beam of unoccupied house, 285.90 meters (938.0 feet), $345^{\circ} 02''$.

Arbuckle Mountain or Mounds (U. S. G. S.) (Murray County, Okla., U. S. G. S. and O. W. Ferguson, 1902; 1920).—About $6\frac{1}{2}$ miles east by north from the village of Elk, $6\frac{1}{2}$ miles south of the village of Hennepin, $\frac{1}{2}$ mile west of the road from Elk and Woodford intersecting the Hennepin and Davis road; $1\frac{1}{2}$ miles southwest of J. F. Copeland's house, 3 miles south of a spring forming the head of Five-Mile Creek, and $\frac{3}{4}$ mile southwest of the head of Zanders Creek, on a high point of Arbuckle Mountain on the south side of the head of a valley or "draw" forming the creek that runs into Eight-Mile Creek, on land occupied by L. Johnson but claimed by J. F. Copeland. The station is the U. S. Geological Survey station "Mounds" and the mark is described in the U. S. Geological Survey Bulletin No. 175, 1900, as "a stone post 28 by 7 by 7 inches, set 24 inches in the ground, with a copper bolt marked 'U. S. + G. S.' sunk in center of top." The original reference mark was a $\frac{1}{2}$ -inch drill hole, $1\frac{1}{2}$ inches deep, circumscribed by a 6-inch triangle cut into the rock, one apex pointing to the station, distant 47.034 meters (154.31 feet) in azimuth $250^{\circ} 16' 01''$. In 1920 this original reference mark was not found, and a new one was established which is a $\frac{3}{4}$ -inch drill hole, 2 inches deep, cut into the rock, 41.94 meters (137.6 feet) from the station in azimuth $247^{\circ} 45' 10''$. The corner stone common to secs. 21, 22, 27, and 28, T. 1 S., R. 1 W., is 801.25 meters (2628.3 feet) from the station in azimuth $281^{\circ} 27' 42''$.

Lone Tree (Carter County, Okla., W. Bowie, 1902).—About 6 miles north and 2 miles east of the town of Cornish, in sec. 6, T. 4 S., R. 3 W., on a bare, prominent ridge called Lone Tree Hill, on land claimed by James Kelly. The station is marked according to note 1. The reference marks are in line with and on opposite sides of the station, one within a few feet of the only two trees on the hill. Reference mark No. 1 is 295.443 meters (969.30 feet) from the station in azimuth $141^{\circ} 57' 08''$; reference mark No. 2 is 108.587 meters (349.69 feet) from it in azimuth $322^{\circ} 23' 21''$. The section corner common to T. 3 S., T. 4 S., R. 3 W., and R. 4 W., is 490.830 meters (1610.33 feet) from the station in azimuth $125^{\circ} 07' 21''$.

Monument (Jefferson County, Okla., O. W. Ferguson, 1902).—About 3 miles east of the village of Addington, on what is known as Monument Hill, 35 meters N. 8° E. of the highest rock on the hill and 4.8 feet lower. The station is 146.3 meters (480 feet) N. 30° E. of the highest rock in the ledge forming the western support of the hill, 4.85 meters (15.9 feet) east of the prolongation of the north-and-south fence that joins the east-and-west fence at the station, on land leased by H. J. Hensley. The station is marked according to note 1. The reference mark is 2.03 meters (6.7 feet) west of the north-and-south fence and 2.06 meters (6.8 feet) north of the east-and-west fence, 180.76 meters (593.0 feet) from the station in azimuth 176° 03' 48". The northeast corner of sec. 2, T. 4 S., R. 7 W., is 679.67 meters (2229.9 feet) from the station in azimuth 201° 17' 09".

Duncan (Stephens County, Okla., W. Bowie, 1902; 1919).—About 5 miles west and 1½ miles south of the town of Duncan, in school sec. 16, T. 1 S., R. 8 W., on a flat-topped hill with woods to the east and north. The station is marked according to note 1. The reference mark is on the edge of the woods to the east of the station and 189.320 meters (621.13 feet) from the station in azimuth 297° 09' 42". The quarter-section cornerstone common to sections 9 and 16, is 439.51 meters (1442.1 feet) from the station in azimuth 217° 29' 00".

Benton (Jefferson County, Okla., W. Bowie, 1902).—About 5 miles east and 1 mile north of Sugden, in sec. 26, T. 5 S., R. 7 W., at the highest point of a ridge running north and south on land claimed by T. W. Williams and leased by J. F. Jackson. The surface mark at the station is the same as described in note 1. The underground mark is a bottle set in concrete, the top of which is 2½ feet below the surface mark. The reference mark is a stone 9 by 11 by 21 inches set in concrete in the southwest corner of Jackson's yard, the center mark being a cross cut in the stone, 23.10 meters (75.8 feet) from the station in azimuth 233° 24' 44". The corner common to secs. 23, 24, 25, and 26, T. 5 S., R. 7 W., is 123.93 meters (406.6 feet) from the station in azimuth 282° 07' 48".

Grady (Jefferson County, Okla., W. Bowie, 1902).—About 2 miles north and 1 mile west of the village of Grady, 4 miles north of the Red River, on the highest and most northerly part of a bare ridge ¾ mile long running north and south in an open prairie, on land claimed by Thomas Gardiner and leased by Calvin Duger. The station and reference marks are as described in note 1, except that instead of a terra-cotta pipe a block of cement 8 inches in diameter and 5 inches deep with a 40-penny wire nail embedded in the top was used for the underground mark and placed 2½ feet below the surface mark. The reference mark is 179.06 meters (587.5 feet) from the station in azimuth 97° 00' 36". The section corner west of the station, is distant 660.0 meters (2165 feet) in azimuth 16° 29' 16".

Blue (Montague County, Tex., W. Bowie, 1902).—About ½ mile north of the town of Nocona, on the Missouri, Kansas & Texas Railway, on a prominent hill known as Blue Mound, on land of D. R. Skeen, 7 yards north of a road fence. The station is marked according to note 1. The reference mark is at a fence corner east of the station, and 128.958 meters (423.09 feet) from the station in azimuth 273° 34' 10". The Nocona School cupola is 962.2 meters (3157 feet) from the station in azimuth 4° 03' 57".

Cube (Clay County, Tex., O. W. Ferguson, 1902).—About 9½ miles south and 2½ miles west of Henrietta, 3 miles east and 1½ miles south of Herrville, 1 mile south of the schoolhouse which is on the Henrietta and Riverdale road, and near the southeast corner of a tract of land designated as "abstract No. 307, Montague County School Land Survey No. E," on the highest part of a hill on land of M. Cueba midway between his house and barn. The station is marked according to note 1. The reference mark is in the field at the southeast corner of Cueba's land, 9.537 meters (31.29 feet) west of a stone in the center of the road, marking Cueba's property corner, and 1 foot north of the center line of posts of his south fence; 223.174 meters (732.20 feet) from the station in azimuth 833° 16' 39". Other distances and azimuths are as follows: East end of the ridge of the barn, 47.66 meters (156.4 feet), 21° 42' 07"; southwest corner of stone chimney of house, 52.46 meters (172.1 feet), 236° 21' 30".

Myers (Clay County, Tex., O. W. Ferguson, 1902).—About 14 miles S. 12° 30' W. of Henrietta, and 3½ miles S. 8° W. of Blue Grove, between the Henrietta and Antelope road to the northwest and the Henrietta and Jacksboro road to the east, on the high wooded ridge 185 meters N. 7° 35' E. of the broken rocky cliff at the end of the hill, and about 140 meters northeast of the highest part of the hill, on land known as the Charlton Thompson survey, owned by W. H. Myers. The surface mark at the station is the same as described in note 1. The underground station mark is a spike set in concrete in a hole 6 inches in diameter and 6 inches deep cut into the rock.

The reference mark is a $\frac{1}{2}$ -inch drill hole in a prominent rock, surrounded by an equilateral triangle 10 inches on a side, one apex of which points to the station. It is located about the center of a rocky break, 28 yards south of the north end of the central promontory and 156.174 meters (512.38 feet) from the station in azimuth $8^{\circ} 17' 57''$. The west gable of the Myers's house is 413 meters (1355 feet) from the station in azimuth $256^{\circ} 55'$.

Queen (Montague County, Tex., W. Bowie, 1902).—About 6 miles west of north from Bowie, at the highest point of a prominent cone-shaped peak known as "Queen Peak," on the land of E. Bates. The surface mark at the station is the same as described in note 1 and is located between three large rocks. The underground mark is a nail embedded in a small block of concrete. The reference marks are two holes, each $\frac{3}{4}$ inch in diameter and $1\frac{1}{2}$ inches deep, drilled in solid rock, and each circumscribed by a triangle. Reference mark No. 1 is 5.57 meters (18.3 feet) from the station in azimuth $192^{\circ} 49'$ and reference mark No. 2 is 5.14 meters (16.9 feet) in azimuth $327^{\circ} 31'$.

Jones (Clay County, Tex., O. W. Ferguson, 1902).—About $2\frac{1}{4}$ miles south and 3 miles west of the town of Vashti, on land formerly belonging to Freestone County School, now owned by J. E. George, 277.3 meters (910 feet), measured on the line of George's partition fence, south from the south fence of the Newport and Henrietta road, 348 meters (1142 feet) southwest from the fence corner formed at the intersection of the south and west roads at the northeast corner of Georges Lane, and 3.48 meters (11.4 feet) south and 3.80 meters (12.5 feet) west of the southeast corner of a cultivated field. The station is marked according to note 1. The reference mark is in the corner of pasture land, 2 feet east of a fence running north and 2.3 feet south of a fence running to the station, 99.028 meters (324.89 feet) from the station in azimuth $96^{\circ} 01' 58''$.

Bowie northwest base (Clay County, Tex., A. L. Baldwin, 1900; 1902).—On a prominent knoll, 1 mile southeast of Bellevue, which is on the Fort Worth & Denver City Railway, on the land of J. D. Orton. The surface mark at the station is the same as described in note 2. The underground mark is a copper bolt leaded into bed rock, 3 feet below the surface of the ground. The reference mark is a red sandstone post, 12 inches deep and 6 inches square projecting 3 inches above the ground, with a hole 1 inch in diameter drilled in the center of the top. It is on the fence line between Orton's ranch and that to the north, 159.16 meters (522.2 feet) from the station in azimuth $176^{\circ} 42'$. Other distances and azimuths are as follows: Southwest corner of Orton's house, 123.74 meters (406.0 feet), $262^{\circ} 27'$; southwest fence corner of Orton's garden, 22.6 meters (74 feet), $191^{\circ} 12'$.

Bowie southeast base (Clay County, Tex., A. L. Baldwin, 1900; 1902).—West of the city of Bowie and southeast of the town of Bellevue, on the highest part of a prominent ridge, on the land of C. H. Bodeker. The station is marked according to note 2. The reference mark is the center of a drill hole $\frac{1}{2}$ inch in diameter and $2\frac{1}{2}$ inches deep, surrounded by a triangle 7 inches on a side, cut in the rock at the top of the ledge southwest of the station, 14 feet from the front angle of a break in the rock and about in the center of a high knob of rock. It is 74.849 meters (245.57 feet) from the station in azimuth $45^{\circ} 30' 44''$. The distance and azimuth to a post marking a corner are, respectively, 423.5 meters (1389 feet) and $109^{\circ} 50'$.

Spradling (Jack County, Tex., W. Bowie, 1902).—About 6 miles south of Newport and 8 miles north of Cundiff, on a wooded hill about 500 yards east of the Newport-Jacksonboro road, on land of J. A. Spradling. The station is marked according to note 1. The reference mark is 11.975 meters (39.29 feet) from the station in azimuth $148^{\circ} 52'$. Other distances and azimuths are as follows: Center of the Spradling house, about 700 yards, $358^{\circ} 02'$; chimney of Mayo's house, about 700 yards, $78^{\circ} 58'$; normal to the fence between the properties of J. A. Spradling and J. W. Mayo, 39.3 meters (129 feet), $97^{\circ} 02'$.

Indian (Jack County, Tex., W. Bowie, 1902).—About $1\frac{1}{2}$ miles west of the eastern branch of the Jacksboro-Antelope road, at the highest point of the most southwesterly of the three prominent peaks known as the Indian Hills, on land of Gabe Waahburn. The station is marked according to note 1. The reference mark is a hole, $\frac{3}{4}$ inch in diameter, drilled to a depth of $1\frac{1}{2}$ inches in solid rock and surrounded by a triangular mark, 13.33 meters (43.7 feet) from the station in azimuth $7^{\circ} 06' 26''$.

Jim Ned (U. S. G. S.) (Montague County, Tex., U. S. Geological Survey).—About 8 miles southwest of St. Jo, 8 miles southeast of Montague, and 1 mile south of Dy Mound (P. O.), at the highest point of the bare, flat hill known as "Jim Ned Lookout," $\frac{1}{2}$ mile east of the Dy Mound-Bowie road, and $\frac{1}{2}$ mile northeast of the house of D. R. Raymond and on his land. The station mark is a bronze tablet in a sandstone post, 30 by 10 by 8 inches, set 28 inches in the ground. Bowie standpipe is about 13 miles from the station in azimuth $75^{\circ} 49' 09''$.

Moore (Jack County, Tex., W. Bowie, 1902).—About $4\frac{1}{2}$ miles southeast of Jacksboro, at the highest point of the south end of a wooded ridge running north and south, on land of H. H. Cobb, of Fort Worth, and about $\frac{1}{2}$ mile north of Cobb's house. The station is marked according to note 1. The reference mark is in a clearing in the woods north of the station, 86.719 meters (284.51 feet) from the station in azimuth $185^{\circ} 42' 18''$.

Davis (Jack County, Tex., W. Bowie, 1902).—About 16 miles southeast of Jacksboro, $4\frac{1}{2}$ miles west of Gibtown and 3 miles south of Joplin, 150 yards southwest of the Jacksboro and Gibtown wagon road, at the highest point of a wooded hill, on land of H. P. Sillivant. The station is marked according to note 1. The reference mark is at the fence corner east of the station, on the west side of the Jacksboro-Gibtown road, 103.115 meters (338.3 feet) from the station in azimuth $284^{\circ} 24' 46''$.

Woolly (Jack County, Tex., O. W. Ferguson, 1902).—In the southwest corner of Jack County, 10 miles east of south from Bryson, 10 miles west of north from Christian, 7 miles northeast of Finis, 2 miles south of the Weatherford-Graham wagon road, 1 mile southwest of Sam Martin's house, and 1 mile south-southeast of Leslie Knight's house. The station is on a high table-land which forms the top of a spur of Salt Creek Mountains, $4\frac{1}{2}$ miles long by $\frac{1}{2}$ to 1 mile wide, extending north-northeast and south-southwest, and lying between Long Hollow Creek to the north and west and Salt Creek to the east, on a level piece of ground on which oak trees are growing, about 1 mile from the southern end of the table-land, on the property of Mr. Knight. The station is marked according to note 1. The reference mark is indicated by three square-blazed oak trees, one 6 inches in diameter, N. 84° W., 7.3 meters (24.0 feet); another 11 inches in diameter, N. 81° E., 8.36 meters (27.4 feet); the third, 9 inches in diameter, S. 13° E., 11.70 meters (38.4 feet). The reference mark is 131.051 meters (429.96 feet) from the station in azimuth $321^{\circ} 08' 33''$. The west gable of Martin's house is about 1 mile from the station in azimuth $226^{\circ} 55' 02''$.

Gilbert (Parker County, Tex., W. Bowie, 1902).—About $6\frac{1}{2}$ miles by road north of west from Weatherford, $1\frac{1}{2}$ miles north of the railway station at Lambert, $\frac{1}{2}$ mile north of the Weatherford-Mineral Wells wagon road, and $\frac{1}{2}$ mile south of the Blue Springs-Weatherford road, at about the center of a prominent bare ridge, on land of Mrs. A. N. Spivey. The station is marked according to note 1. The reference mark is located in a fence line east of the station, near the top of the ridge, and 109.831 meters (360.34 feet) from the station in azimuth $261^{\circ} 56' 39''$.

Kyle (Palo Pinto County, Tex., O. W. Ferguson, 1902).—About 4 miles north by west from the town of Palo Pinto, $1\frac{1}{2}$ miles west of the Palo Pinto-Jacksboro wagon road, and 3 miles south of the ford where this road crosses the Brazos River, on the highest part of Kyle Mountain, which rises above the south bank of the Brazos River, and the top of which is a table-land of 2 acres area. The station is in the middle of this table-land longitudinally and about $\frac{1}{4}$ of the distance from the northeast end, on land of Mrs. T. Anna McClure. The station mark is a 6-inch bed of concrete sunk 24 inches below the surface, containing a wire spike which projects $\frac{1}{4}$ inch above the top of the concrete, covered with 4 inches of sand, above which is a piece of terra-cotta pipe 14 inches long embedded in concrete, with a 60-penny wire nail at the center. The reference mark is a drill hole, $\frac{5}{8}$ inch in diameter and $1\frac{1}{2}$ inches deep, in one of the highest and most prominent of the large rocks near the station, surrounded by a triangle, 5 inches on a side, with one apex pointing toward the station, cut into the rock. It is 52.472 meters (172.15 feet) from the station in azimuth $38^{\circ} 07' 22''$.

Oaks (Palo Pinto County, Tex., O. W. Ferguson, 1902).—About 9 miles by wagon road south of Mineral Wells, on the east shore of the Brazos River, at about the extreme southwest point of a long, high ridge of table-land, 50 yards from the edge of the bluff to the southwest, and near the south end of G. D. Oaks's ranch, on land claimed by both G. D. Oaks and J. H. Wharton. The surface mark at the station is the same as described in note 1. The underground mark is a large spike embedded in concrete. The location is indicated by two trees, one, an elm 10 inches in diameter, blazed with a box 3 feet above ground, 5.9 meters (19 feet), N. 19° W. from the station; the other, an oak 12 inches in diameter, box blazed, 7.4 meters (24 feet), S. 7° E. The reference mark is 3.6 feet south of the east-and-west wire fence put up by Wharton, and in line (extended) of the wire fence running from this fence northwest. It is 131.432 meters (431.21 feet) from the station in azimuth $198^{\circ} 13' 58''$. The west pier of the Texas & Pacific Railway bridge across the Brazos River is about $1\frac{1}{4}$ miles from the station in azimuth $354^{\circ} 05' 15''$.

Comanche (Hood County, Tex., U. S. G. S., 1888, W. Bowie, 1902).—About $4\frac{1}{2}$ miles west of south from the town of Granbury, on what is known as Comanche Peak, near the southern edge of an open ground, over the same point as used by the U. S. Geological Survey in 1888. The station mark is as described in note 1, except that

2-inch galvanized iron pipes were used in place of the usual terra-cotta pipes. The reference mark is at the edge of the brush, 49.306 meters (161.76 feet) from the station in azimuth $78^{\circ} 20' 01''$.

McClenny (Erath County, Tex., O. W. Ferguson, 1902).—About 6 miles by road north of the town of Morgan Mills, on the Morgan Mills-Caraway-Roberts Settlements road, between the Morgan Mills-Gordan road to the west and the Morgan Mills-Santo road to the east, at the center and highest point of a long wooded ridge extending east-northeast and west-southwest. The station is between Paluxy Creek to the south and Buck Creek to the north, $\frac{3}{4}$ mile west by south from what is known as "B. D." spring, and 100 yards east of the road, on the land of Dr. R. E. McClenny. The station is marked according to note 1, and its location is indicated by three square-blazed oak trees; one, 14 inches in diameter, 13.17 meters (43.2 feet), N. 38° E.; another, 9 inches in diameter, 6.20 meters (20.3 feet), S. 65° E.; the third, 8 inches in diameter, 5.13 meters (16.8 feet), N. 88° W. The location of the reference mark is indicated by three oak trees; one, 10 inches in diameter, 3.10 meters (10.2 feet), N. 34° E.; another, 6 inches in diameter, 6.25 meters (20.5 feet), S. 56° E.; the third, $8\frac{1}{2}$ inches in diameter, 6.70 meters (22.0 feet), S. 83° W. The reference mark is 53.915 meters (176.89 feet) from the station in azimuth $198^{\circ} 47' 28''$. The east gable (end of ridge beam) of O. G. Roberts's house is about $\frac{3}{4}$ mile from the station in azimuth $138^{\circ} 54' 45''$.

Pilot (Erath County, Tex., W. Bowie, 1902).—About 5 miles northeast of Stephenville, $\frac{3}{4}$ mile south of the upper Stephenville-Granbury wagon road, near the north-west side of the round top of a flat-topped peak known as "Pilot Knob," and about 60 yards northeast of a pond of water on the western side of the hill, on land of J. W. Chenault. The station is marked according to note 1, except that the underground mark is a 60-penny wire nail, set in 6 inches of concrete. The reference mark is in the southwest corner of Chenault's garden, 315.473 meters (1035.01 feet) from the station in azimuth $62^{\circ} 29' 22''$.

Lone Mountain (Erath County, Tex., W. Bowie, 1902).—About 1 mile west of north from Skipper Gap, near the southeast corner of the top of "Lone Mountain" on land of J. B. Vesey. The station is marked according to note 1. The reference mark is a hole drilled in a rock and surrounded by a triangle cut in the rock southeast of the station and indicated by a pile of stones, 3 feet high, placed over it. It is 35.027 meters (114.92 feet) from the station in azimuth $323^{\circ} 28' 57''$.

Young (Erath County, Tex., O. W. Ferguson, 1902).—About 6 miles west-southwest of Stephenville, $6\frac{1}{2}$ miles southwest by south from Singleville, 8 miles north by east from Dublin, and $\frac{1}{2}$ mile north of the Stephenville-De Leon road, on a high prairie pasture lying south of the South Bosque, northwest of Alarm Creek, and northeast of the Green Creek tributaries, on land of J. H. Young. The station is marked according to note 1. The reference mark is just within the fence at the southwest corner of Young's pasture, 4.51 meters (14.8 feet) from the center of a narrow lane running northeast and southwest, 2.28 meters (7.5 feet) northeast of a lane running northwest and southeast, 291.457 meters (956.22 feet) from the station in azimuth $357^{\circ} 11' 51''$. Other distances and azimuths are as follows: D. D. H. Moore's house, center of chimney at west end, about 700 yards, $3^{\circ} 13' 35''$; N. W. Kiker's house, center of chimney at west end, about 850 yards, $35^{\circ} 58' 39''$; tile chimney at the south end of Mr. Young's house, about 1600 yards, $236^{\circ} 45' 05''$.

Gatlin (Erath County, Tex., O. W. Ferguson, 1902).—About 9 miles by road N. 21° W. from the courthouse at Stephenville, 3 miles S. $72^{\circ} 30'$ E. from Huckabay, 1 mile northeast of the Stephenville-Thurber road, about 600 yards east from the Bethel-Huckabay road, 117 yards northeast from the lane running to the house of W. E. Carr, and 36.34 meters (119.2 feet) north from the line fence of Gatlin and Thompson, which extends northeast and southwest, at the highest point of a wooded rocky hill, on the land of E. J. Gatlin. The station is marked according to note 1 except that the underground mark is a 60-penny wire nail set in 6 inches of concrete. The reference mark is 8 inches from the northeast fence along the lane to Mrs. Carr's house, on the field side, 107.772 meters (353.58 feet) from the station in azimuth $78^{\circ} 18' 44''$. Other distances and azimuths are as follows: Center of the eastern face of a stone chimney at the eastern end of Mrs. Carr's house, 166.85 meters (547.41 feet), $44^{\circ} 01' 24''$; center of the chimney of the house of Robert Thompson, about $\frac{1}{2}$ mile, $307^{\circ} 23' 05''$.

Stephenville north base (Erath County, Tex., A. L. Baldwin, 1900; 1902).—About $5\frac{1}{2}$ miles east of the courthouse at Stephenville, $\frac{1}{2}$ mile north of the road to Skipper Gap post office, at the highest point of a knoll known as Bunker Hill, on land of J. B. McAdams. The station is marked according to note 2. The reference mark is a hole surrounded by a triangle on the south side of the remains of an old chimney just north of the station, 9.94 meters (32.6 feet) from the station in azimuth $165^{\circ} 28' 32''$.

Alarm (Erath County, Tex., O. W. Ferguson, 1902).—About 3 miles S. 32° W. from the courthouse at Stephenville, $\frac{1}{4}$ mile north of Lee Hughes's house, which stands on the north side of the "Lower Dublin road," on a high wooded ridge, which is girded on the south, west, and east sides by a bend of Alarm Creek, on the land of J. P. Syler. The station is marked according to note 1, and its location is indicated by three box-blazed oak trees; one, 10 inches in diameter, 10.42 meters (34.2 feet), S. 25° W.; another, 11 inches in diameter, 7.51 meters (24.6 feet), S. 44° W.; the third, 7 inches in diameter, 6.05 meters (19.8 feet), N. 84° W. The location of the reference mark is indicated by two box-blazed oak trees; one, 12 inches in diameter, 4.30 meters (14.1 feet), S. 72° E.; the other, 10 inches in diameter, 6.13 meters (20.1 feet), S. 34° W. The reference mark is 76.584 meters (251.26 feet) from the station in azimuth 148° 25' 59". The distances and azimuths to other points are: End of ridge beam, west gable, house of W. H. Shanley, about 300 meters, 256° 16' 42"; chimney on north end of house of Lee Hughes, about 400 meters, 342° 38' 05".

Stephenville south base (Erath County, Tex., A. L. Baldwin, 1900; 1902).—About 1 mile south of west from Selden, 8 miles southeast from Stephenville, near the southern extremity of a low wooded ridge, about 300 yards south of the house of Thomas Perry. The station is marked according to note 2. The reference mark is a cross cut in a stone, which is about 12 by 4 by 30 inches deep and marked with the letters "U. S." It is 2 meters from a tree blazed with a triangle and 24.722 meters (81.11 feet) from the station in azimuth 44° 32' 23".

Gibson (Erath County, Tex., W. Bowie, 1902).—About 14 miles southeast of Dublin, 3 miles by wagon road northwest of Carlton, on the land of J. T. Gibson, 70 yards southwest of his house, and 15 yards from the Carlton-Hamilton wagon road. The station is marked according to note 1. The reference mark is just southwest of Gibson's house in the corner of his garden, 39.213 meters (128.65 feet) from the station in azimuth 202° 47' 31".

Gleason (Hamilton County, Tex., O. W. Ferguson, 1902).—About 9 miles S. 33° E. from the city of Hico, $2\frac{1}{2}$ miles northeast by east from the village of Fairy or Martins Gap, on a high ridge $\frac{1}{2}$ mile north of what is known as Cedar Spring, and about 200 yards north of the center of the land of John Linebarger. The surface station mark and reference mark are as described in note 3. The underground station mark is a 60-penny wire nail set in 6 inches of concrete. The reference mark is 1 foot west of Linebarger's partition fence running north and south between the cultivated and pasture land, 85.059 meters (279.06 feet) from the station in azimuth 331° 42' 16". Other distances and azimuths are as follows: Stone 12 by 14 by 3 inches, slightly embedded, bearing the faint mark "U S + G S," 6.953 meters (22.81 feet), 243° 15' 36"; center of an oak tree 20 inches in diameter, on which the scaffold of the U. S. Geological Survey rested, 8.380 meters (27.49 feet), 243° 56' 18"; south end of the ridge beam of the house of J. F. Merritt, about $\frac{1}{2}$ mile, 109° 58' 44"; north end of the ridge beam of Mr. Linebarger's house, about $\frac{1}{4}$ mile, 117° 57' 34".

Chamliiss (Hamilton County, Tex., W. Bowie, 1902).—About 3 miles south of the town of Hamilton, on the more northern of two prominent knolls, on the land of J. M. Chamliiss, 100 yards northwest of his house. The station mark is as follows: A hole, 20 inches in diameter, was dug 16 inches deep down to bed rock, and a hole, 3 inches in diameter and 8 inches deep, was drilled in the rock; this lower hole was nearly filled with cement in which a 60-penny wire nail was inserted, with its point 2 inches below the surface of the rock; the lower hole was then filled with sand level with the rock, and a piece of terra-cotta pipe, 16 inches long, and the surface mark set in the usual way. The reference mark, as described in note 1, is near the Hamilton-Lampasas wagon road, at a fence corner which is the northeast corner of the Chamliiss property, 271.296 meters (890.08 feet) from the station in azimuth 240° 04' 48".

Scoggins (Hamilton County, Tex., O. W. Ferguson, 1902; 1919).—About 5 miles from Jonesboro, at the west side of the road along a high ridge 300 yards west of the road leading north from Jonesboro, on the Strickland Ranch west of a cultivated field. The surface and reference marks are as described in note 3. The underground mark is a 60-penny wire nail set in concrete. The reference mark is 6 inches west of the fence on the east side of the road which separates the meadow land from the pasture land, 69.286 meters (227.32 feet) from the station in azimuth 188° 37' 45". The west end of the ridge beam of the house of J. S. Scroggin is 144.033 meters (472.55 feet) from the station in azimuth 320° 06' 41".

Brown (Coryell County, Tex., W. Bowie, 1902).—About 4 miles by wagon road southeast of Evant, $\frac{1}{4}$ mile north of the Pearl-Evant wagon road, in the southeast corner of a field, on the land of W. H. Brown and about 600 yards south of his house. The station and reference marks are as described in note 3. The reference mark is

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

located in the woods south of the station and within 10 yards of three large oak trees marked with triangles facing it, 94.035 meters (308.51 feet) from the station in azimuth $9^{\circ} 23' 32''$.

King (Coryell County, Tex., O. W. Ferguson, 1902; 1919).—About $9\frac{1}{4}$ miles southwest of Gatesville, 1 mile northeast of King post office, $1\frac{1}{4}$ miles south of the Gatesville-Pearl wagon road, $\frac{1}{4}$ mile north of the Gatesville-Lampasas road, and $1\frac{1}{2}$ miles northeast from Cowhouse Creek, on the northwest side of the highest and northernmost of two prominent hills which are the last of a high ridge extending to the northwest. The station is marked by a standard bronze tablet set in concrete, and the underground mark is a nail set in a 2 by 24 inch galvanized-iron pipe which is filled with and set in concrete. The reference mark, described in note 1, is in an open space of ground in line with two live-oak trees, 6 inches in diameter and about 2 yards apart, the nearer tree being box-blazed and distant 4.45 meters (14.6 feet) N. 7° E. from the reference mark. The reference mark is 57.153 meters (187.51 feet) from the station in azimuth $118^{\circ} 15' 55''$. Other distances and azimuths are as follows: South end of the ridge beam of the house of A. F. Neutzter, about $\frac{3}{4}$ mile, $190^{\circ} 52' 45''$; spire of the German Evangelical Church, about 2 miles, $213^{\circ} 36' 32''$.

Franklin (Lampasas County, Tex., W. Bowie, 1902).—About 14 miles southwest of Copperas Cove, 3 miles south of east of Higgins Gap, near the southern extremity of a very prominent wooded ridge, running about northwest and southeast, on the land of B. M. Franklin, of Lampasas. The station and reference marks are as described in note 3. The reference mark is south of the station and about 2 yards east of a twin oak tree, each of the two parts of which is marked with a triangle facing the reference mark, 82.585 meters (270.95 feet) from the station in azimuth $342^{\circ} 55' 33''$.

Gilmore (Coryell County, Tex., O. W. Ferguson, 1902).—In the southwest corner of Coryell County, 2 miles S. 78° W. from the village of Copperas Cove, at the highest point and center of a wooded, starfish-shaped mountain, 150 yards north of the point where the telephone line crosses the ridge, on the land of J. N. Gilmore. The station is marked according to note 1, and its location is indicated by three trees, one, a black oak, 7 inches in diameter, 11.41 meters (37.4 feet), S. 55° E.; another, a live oak, 12 inches in diameter, 20.15 meters (66.1 feet), S. 25° W.; and the third, a red oak, 8 inches in diameter, 17.11 meters (56.1 feet), N. 11° E. The reference mark is indicated by two box-blazed live oaks, one, 6 inches in diameter, 5.57 meters (18.3 feet), N. 18° E.; the other, 8 inches in diameter, 3.36 meters (11.0 feet), N. 73° E. The reference mark is 91.106 meters (298.90 feet) from the station in azimuth $215^{\circ} 49' 12''$. Other distances and azimuths are: Center of south face of stone chimney on the house of H. B. Scott, about $1\frac{1}{4}$ miles, $201^{\circ} 51' 41''$; center of chimney on the house of C. H. Cosper, about $\frac{3}{4}$ mile, $180^{\circ} 58' 11''$.

Flat Top (Lampasas County, Tex., W. Bowie, 1902).—About 8 miles northwest of Lampasas, $\frac{3}{4}$ mile north of the Lampasas-Lorrietta wagon road, at about the center of the crest and 75 yards from the southeast end of what is known as Flat Top Peak. The station is marked as follows: A hole, 20 inches in diameter, was dug 16 inches deep, to bed rock, then a hole, 3 inches in diameter, was drilled to a depth of 8 inches; in this hole a copper bolt, 1 inch in diameter and 4 inches long, was set and surrounded by cement, the top of the bolt being 4 inches below the surface of the rock; the lower hole was then filled to the surface of the rock with sand. The surface mark is the same as described in note 1. The reference mark is a hole drilled in solid rock and surrounded by a triangle cut in the rock, 17.396 meters (57.07 feet) from the station in azimuth $149^{\circ} 53' 08''$.

Bachelor (Burnet County, Tex., W. Bowie, 1902).—About 8 miles by road south of east of Lampasas, about 600 yards northeast of the Lampasas-Georgetown wagon road, at the center of the top of a sharp-pointed hill called "Bachelor Peak," on the land of A. S. Eldredge. The peak was a station of the U. S. Geological Survey, but no station mark was found. Owing to the shape of the hill, it is probable that the stations were within a yard of each other. The station mark is the same as described for Flat Top except that a 60-penny wire nail was used for the underground mark. No reference mark was put in on account of the sharpness of the peak.

Lampasas northeast base (Lampasas County, Tex., A. L. Baldwin, 1900; 1902).—About $2\frac{1}{2}$ miles S. 80° E. of Lampasas, 250 yards north of the Lampasas-Belton road, 300 yards south of Sulphur Creek, at the highest and most northerly rocky and wooded point, on the land of J. W. Mosley. The station is marked according to note 2. The reference mark is a $\frac{3}{4}$ -inch hole drilled to a depth of 2 inches and surrounded by a triangle cut into the rock which is the highest in the vicinity, 24.743 meters (81.18 feet) from the station in azimuth $70^{\circ} 57' 31''$. Other distances and azimuths are as follows: Stone chimney of the house of Judge Parks, about 550 yards,

191° 39' 49"; stone chimney on house of Alec Northern, about 1000 yards, 310° 36' 40"; stone chimney on house of Will Griffin, about 1200 yards, 314° 44' 20".

Lampasas southwest base (Burnet County, Tex., A. L. Baldwin, 1900; 1902).—About 2 miles S. 8° E. from Lampasas, $\frac{1}{4}$ mile east of the Settlement road, and 1 mile west of the Lampasas-Austin road, on the land of J. H. H. Berry. The station is marked according to note 2. The reference mark, located at the break of the hill in the most prominent cap rock, is a hole $\frac{3}{4}$ inch in diameter drilled $1\frac{3}{4}$ inches into the rock and surrounded by a triangle 5 inches on a side cut in the rock, 43.957 meters from the station in azimuth 52° 33' 13". Distances and azimuths to other points are: Stone chimney on Russell house, about $1\frac{1}{4}$ miles, 253° 00' 08"; stone chimney on the house of J. P. Berry, about $\frac{1}{2}$ mile, 294° 24' 41".

May (Burnet County, Tex., W. Bowie, 1902).—About 17 miles west of south of Lampasas, 8 miles north of Burnet and 30 yards west of the Lampasas-Burnet wagon road, on a wooded ridge running about northeast and southwest, on land of A. L. May and 100 yards northeast of his house. The surface and reference marks at the station are the same as described in note 1. The underground station mark is the same as described for *Flat Top*. (See p. 50.) The reference mark is about 60 yards west of May's house, 151.635 meters (497.49 feet) from the station in azimuth 51° 56' 09". Other distances and azimuths are as follows: U. S. Geological Survey flagpole in a tree, 57.54 meters (188.8 feet), 143° 29' 36"; center of a big stone chimney on Mr. May's house, about 90 yards, 37° 09' 39".

Gabriel (Williamson County, Tex., O. W. Ferguson, 1902).—About 2 miles, S. 37° W. of Gabriel Mills, about 700 yards east of the Georgetown-Roundrock-Gabriel Mills-Lampasas road, on the southwest point of what is known as Pilot Knob, on the land of J. M. Pearson, and $\frac{3}{4}$ mile west of his house. The station is marked according to note 2. The reference mark to the north (No. 1) is indicated by two box-blazed trees, one a post oak 8 inches in diameter, 8.36 meters (27.4 feet), N. 86° E.; the other, a black jack 5 inches in diameter, 4.94 meters (16.2 feet), S. 18° E. The reference mark to the south (No. 2), located at the southwest corner of the hill, is a hole $\frac{3}{4}$ inch in diameter and $\frac{7}{8}$ inch deep drilled in the rock and surrounded by a triangle with 3-inch sides. This mark is indicated by three oak trees, one, 6 inches in diameter, 15.83 meters (51.9 feet), N. 42° E.; another, 14 inches in diameter, 13.05 meters (42.8 feet), N. 78° E.; the third, 10 inches in diameter, 13.86 meters (61.9 feet), S. 67° E. Reference mark No. 1 is 76.260 meters (250.20 feet) from the station in azimuth 184° 32' 10". Reference mark No. 2 is 24.067 meters (78.96 feet) from the station in azimuth 15° 38' 51".

Supplementary stations.

Section 13, northwest corner T. 29 N., R. 7 W. (Oklahoma and Kansas, W. Bowie, 1902).—A stone approximately in the boundary line between Oklahoma and Kansas. It is common to secs. 13 and 14, T. 29 N., R. 7 W.

Boundary stone 163 (Kans. and Okla., W. Bowie, 1902).—On the southern line of sec. 15, T. 35 S., R. 6 W., about 730 yards west of the southeast corner of sec. 15, and 157.3 meters (516 feet) east of the fence corner on the eastern side of the entrance to the house of Ira Livingood. The stone, which is of white sandstone 12 by 5 by 20 inches deep, was found in good condition and solidly set in the ground, projecting about 6 inches. It is marked as follows: On top, "163," north side, "K," and south side, "I. T."

Boundary stone 160 (Kans. and Okla., W. Bowie, 1902).—In the line of fence on the south side of the boundary road, on the northern line of school sec. 13, T. 29 N., R. 7 W., and 1077.1 meters (3534 feet) east of the northwest corner of said section. The stone was found loose and reversed, but was placed in right position. It is of white sandstone, 12 by 5 by 20 inches deep, projecting about 9 inches, and is marked on top "160," north side, "K," and south side, "I. T."

Sand Hill reference mark (Woods County, Okla., W. Bowie, 1902).—At the fence corner south of the corner stone common to secs. 25 and 36, T. 28 N., R. 9 W. (See *Sand Hill*, p. 41.)

Quarter-section corner, secs. 25 and 36 (Woods County, Okla., W. Bowie, 1902).—A stone. (See *Sand Hill*, p. 41.)

Section 14, southeast corner, T. 28 N., R. 5 W. (Grant County, Okla., O. W. Ferguson, 1902).—(See *Renfrow*, p. 41.)

Township corner, Ts. 25 and 26 N., Rs. 6 and 7 W., (Grant County, Okla., W. Bowie, 1902).—Cedar post. (See *Vicar*, p. 41.)

Section 3, southwest corner, T. 24 N., R. 4 W. (Garfield County, Okla., O. W. Ferguson, 1902).—A stone. (See *Hahn*, p. 41.)

Center section 25, T. 23 N., R. 4 W. (Garfield County, Okla., O. W. Ferguson, 1902).—(See *Garber*, p. 42.)

Quarter-section corner, secs. 23 and 24 (Garfield County, Okla., W. Bowie, 1902).—A stone. (See *Waukomts*, p. 42.)

Section 29, southwest corner, T. 17 N., R. 7 W. (Kingfisher County, Okla., W. Bowie, 1902).—(See *Burson*, p. 42.)

Section 17, southeast corner, T. 14 N., R. 6 W. (Canadian County, Okla., O. W. Ferguson, 1902).—A stone. (See *Eichoff*, p. 42.)

Caddo reference mark (Canadian County, Okla., W. Bowie, 1902).—On a sand dune. (See *Caddo*, p. 43.)

Section 9, southeast corner, T. 11 N., R. 7 W. (Canadian County, Okla., W. Bowie, 1902).—A stone. (See *Elreno east base*, p. 43.)

Old boundary post (Grady County, Okla., W. Bowie, 1902).—A cottonwood post. (See *Carson*, p. 43.)

Carson reference mark (Grady County, Okla., W. Bowie, 1902).—(See *Carson*, p. 43.)

Quarter-section corner, secs. 5 and 8, T. 9 N., R. 7 W. (Grady County, Okla., W. Bowie, 1902).—A stone. (See *Carson*, p. 43.)

Quarter-section corner, secs. 7 and 8, T. 6 N., R. 2 W. (McClain County, Okla., O. W. Ferguson, 1902).—A stone. (See *Purcell*, p. 43.)

Boundary mark, Indian Territory and Oklahoma (Canadian County, Okla., W. Bowie, 1902).—A monument.

Marlow secondary (Grady County, Okla., W. Bowie, 1902).—About $4\frac{1}{2}$ miles north and $\frac{1}{2}$ mile east of the town of Marlow, $\frac{1}{2}$ mile east of the Chicago, Rock Island & Pacific Railway, on a bare hill, in sec. 21, T. 3 N., R. 7 W. The station is marked by an iron pipe, 2 inches in diameter and 24 inches long, set in the ground so as to project 6 inches and filled and surrounded by a column of concrete 20 inches deep and 18 inches in diameter. In the top of the pipe is a 40-penny wire nail with the point projecting $\frac{1}{4}$ inch.

Marlow latitude station (Stephens County, Okla., Edwin Smith, 1899).—In the northeast corner of the public-school lot, at the southwest corner of Fifth Street and Brummett Avenue, Marlow, a rough stone pier 10.2 feet west of Marlow longitude station.

Marlow longitude station (Stephens County, Okla., Edwin Smith, 1899). The station is a concrete pier marked by a bronze station mark in the center. (See *Marlow latitude station*.)

Marlow azimuth station (Stephens County, Okla., Edwin Smith, 1899).—Located 331.35 feet south of *Marlow longitude station*. The station mark is a stone with a copper bolt.

Boundary mile 45 (Grady County, Okla., W. Bowie, 1902).—About $2\frac{1}{4}$ miles west and $1\frac{1}{4}$ miles north of the town of Marlow. It is one of the U. S. Geological Survey boundary marks. The station mark is an iron post, surrounded by a brick and cement pier, with a copper or brass cap, on which is the following inscription:

U. S. Geol. Survey
Oklahoma
Boundary
Line
Indian Territory
Mile 45
Elevation 1269 feet
T. 2 N., R. 8 W.
S. 1

Section 3, southeast corner, T. 2 N., R. 3 E. (Garvin County, Okla., O. W. Ferguson, 1902).—A stone. (See *Table Hill*, p. 44.)

Section 21, southeast corner, T. 1 S., R. 1 W. (Murray County, Okla., O. W. Ferguson, 1902).—A stone. (See *Arbuckle Mountain*, p. 44.)

Section 25, southwest corner, T. 1 S., R. 5 W. (Stephens County, Okla., O. W. Ferguson, 1902).—A stone. (See *Arbuckle*, p. 44.)

Quarter-section corner, secs. 9 and 16 (Stephens County, Okla., W. Bowie, 1902).—A stone. (See *Duncan*, p. 45.)

Section 2, northeast corner, T. 4 S., R. 7 W. (Jefferson County, Okla., O. W. Ferguson, 1902).—A stone. (See *Monument*, p. 45.)

Township corner, Ts. 3 and 4 S., Rs. 3 and 4 W. (Carter County, Okla., W. Bowie, 1902).—(See *Lone tree*, p. 44.)

Section 24, southeast corner, T. 5 S., R. 7 W. (Jefferson County, Okla., W. Bowie, 1902).—(See *Benton*, p. 45.)

Section corner, near station Grady (Jefferson County, Okla., W. Bowie, 1902).—(See *Grady*, p. 45.)

Evans, (?) (U. S. G. S.) (Hamilton County, Tex., O. W. Ferguson, 1902).—A stone. (See *Gleason*, p. 49.)

Pond Creek astronomic station (Grant County, Okla., W. H. Burger, 1906; 1920).—In the high-school grounds, originally the courthouse square, in Pond Creek. The station is the center of a tile 4 inches in diameter and 26 inches long, set with the top 2 inches below the surface of the ground. In 1920 the following distances and azimuths were measured: Center pipe of water tower, 56.23 meters, $127^{\circ} 56'$; northeast corner of schoolhouse, 51.48 meters, $225^{\circ} 52'$; northwest corner of schoolhouse, 39.20 meters, $255^{\circ} 28'$; northeast corner of south vault, 30.30 meters, $286^{\circ} 00'$; northwest corner of south vault, 31.64 meters, $293^{\circ} 12'$.

LAMPASAS TO SEGUIN, TEX.

Principal points.

Buzzard (Burnet County, Tex., O. W. Ferguson, 1903).—About 9 miles by road and 7 miles direct southwest from Bertram, $1\frac{1}{2}$ miles southwest of Old Cedar Mills, and about 1 mile east by north from "Buzzard Roost," on Post Oak Ridge. The station is at the north edge of the woods and the south edge of a cotton field, on land owned by William Rodgers who lives a quarter mile northwest on the edge of the same field, and is 6.83 meters north of the wire fence along the woods line. The station was marked according to note 3. The reference mark is in the field $\frac{1}{2}$ meter from the wire fence and 67.603 meters (221.80 feet) from the station in azimuth about 325° .

Post (Burnet County, Tex., W. H. Burger, 1903).—About 1 mile west of Burnet, on Post Mountain, in a pasture belonging to Mr. James Cole who lives at Burnet, near the south edge of a small open rocky space near the south edge of the mountain, 8 or 9 paces from the brow. The top of the mountain is covered with small brush and trees 10 to 20 feet high. The station is marked according to note 5. Reference mark No. 1 is on the highest part of a large flat rock (rising about 8 inches above the ground) at the west edge of the open space at the south brow of the mountain, about 21 paces from the south brow, 29 paces from the brow to the westward, and 55 paces from the brow to the eastward. It is 21.992 meters (72.15 feet) from the station in azimuth $150^{\circ} 04' 51''$. Reference mark No. 2 is on a large flat rock rising 5 inches above the ground at the north edge of the open space mentioned above, and 37.245 meters (122.19 feet) from the station in azimuth $180^{\circ} 55' 55''$. The distances and azimuths to certain points are: Witness tree, 8.38 meters (27.5 feet), 138° ; high school, Burnet, 1 mile, 239° ; courthouse, Burnet, 1 mile, $251^{\circ} 32' 39''$; center chimney of Mr. Paire's house, 1 mile, $111^{\circ} 13' 11''$; railroad water tank $\frac{1}{2}$ mile south of Burnet, $285^{\circ} 14' 59''$.

Travis (Travis County, Tex., O. W. Ferguson, 1903; 1904).—About $3\frac{1}{2}$ miles in a direct line from Travis; $\frac{3}{4}$ mile in a direct line about N. 12° E. from a tank on the northeast side of the Leander-Travis Peak wagon road at a sharp turn in the road; in the Woolf pasture, upon the highest and gently rounding top of Post Oak Ridge, at its northeastern extremity. The station is marked according to note 3, except there is no reference mark. "Travis Peak," a high lone conical-shaped hill, about 3 miles distant, is in azimuth $119^{\circ} 35' 18''$. A live oak tree 4 inches in diameter, distant from the station 28.12 meters (92.3 feet), in azimuth $280^{\circ} 38' 42''$, is marked by an isosceles triangle, base 3 inches, sides 5 inches, cut deeply into the tree on the side facing the station and 8 inches above the ground. A Spanish oak tree 7 inches in diameter at the base and 8.10 meters distant, in azimuth $51^{\circ} 06' 27''$, is marked 10 inches above ground on the side facing the station by a deeply cut equilateral triangle, $3\frac{1}{2}$ inches on a side. A Spanish oak 8 inches in diameter, distant 35.14 meters (115.3 feet) in azimuth $83^{\circ} 45' 31''$, is marked 1 foot above the ground on the side facing the station by a deeply cut equilateral triangle 5 inches on a side.

Shovel (Blanco County, Tex., W. H. Burger, 1903).—On the west and highest part of Shovel Mountain, about 9 miles east of south from Marble Falls, and $2\frac{1}{2}$ miles east of south from Shovel Mount post office, on land owned by Frank Ebeling, who lives about 3 miles north of the mountain. The mountain is very prominent and can be seen for quite a distance; its west edge is very abrupt. The station is about 38 paces from the brow to the westward, 49 paces from the brow to the southward, in about the center of the clearing on the top of the mountain, and just north of the south clump of bushes in the clearing. It is marked according to note 4. Distances and azimuths to various points are: Mr. Ebeling's, $2\frac{1}{2}$ miles, $173^{\circ} 18' 09''$; top of small U. S. G. S. cairn, $\frac{3}{8}$ mile, $226^{\circ} 19' 21''$; to reference mark, 63.566 meters (175.74 feet), 161° .

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

Shingle (near Travis and Hays County line, Tex., W. H. Burger, 1903).—Five miles northwest of Fitzhugh, on a prominent bald-topped hill, the north one of a series known for miles around as the "Shingle Hills;" 23 paces from the brow of hill on line to Shovel Mountain, 10 paces from the brow to the eastward, 20 paces from the brow to the westward, 40 paces from the brow to the southward on line to Cedar (which passes just to the west of the house of Mr. Chisholm, 1 mile distant) and 39 paces eastward from the posts of an old fence line (county line?) at its highest point in crossing Shingle Hill. The station is marked according to note 5. The reference mark is in the top of a flat stone nearly level with the ground, 7 paces from the brow of the hill toward Shovel Mountain, and 14.148 meters (46.42 feet) from the station in azimuth $128^{\circ} 55' 31''$. Distances and azimuths to various points are: Mr. Wilkie's house, $1\frac{1}{4}$ miles, $152^{\circ} 36' 58''$; Mr. Chisholm's house, 1 mile, $312^{\circ} 02' 25''$; Albert Scott's house $\frac{1}{2}$ mile, $328^{\circ} 10' 59''$.

Barton (Travis County, Tex., O. W. Ferguson, 1903; 1904).—Six miles direct W. 19° N. from Austin, and 8 miles by wagon road, on the north side of the Austin and Bee Caves wagon road, on a prominent rounded hill covered with small timber, abreast of and north of the 8-mile post, upon very rocky ground. The station is marked according to note 3, except that the reference mark is the center of a $\frac{1}{4}$ -inch drill hole, surrounded by a 5-inch triangle, on the most prominent large rock upon the very highest part of the hill, distant 16.193 meters (53.13 feet) from the station in azimuth $54^{\circ} 27' 08''$. The stone chimney on the north end of a stone house is in plain view on the slope, $3\frac{1}{2}$ miles distant, in azimuth $42^{\circ} 13' 45''$.

Cedar (Hays County, Tex., O. W. Ferguson, 1903, 1904).—Two and one-half miles south of Cedar Valley, upon land owned by Fred Willie, a German, and one of the first settlers, about 1 mile east of his house, and about 150 meters southwest from the line between Travis and Hays Counties which runs southeast, upon a rather high hill densely covered with cedar. The station was marked as described in note 4, the point of the nail of the underground mark being 27 inches below the surface. The reference mark, a deep triangle 5 inches on a side facing the station and cut into the base of a live oak tree 1 foot in diameter 0.55 meter above the ground, is distant 6.191 meters (20.31 feet) from the station (inclined measurement) and 7.380 meters (24.21 feet) (inclined measurement) from *Cedar Hill* (U. S. G. S.). The large stone chimney in the end of Fred Willie's house is distant about 1 mile, in azimuth $81^{\circ} 36' 05''$; the center of the stone chimney on Friendship Church is $1\frac{3}{4}$ miles distant, in azimuth $247^{\circ} 11' 08''$; and the center of the stone chimney on the north end of Mr. Rissman's stone house is distant about $1\frac{1}{2}$ miles, in azimuth $173^{\circ} 19' 14''$.

Loneman (Hays County, Tex., W. H. Burger, 1903).—Eighteen miles by road northwest of Kyle, on the International & Great Northern Railway, and about 6 miles north of Wimberly, on the north side of the Blanco City and Kyle wagon road which passes near the foot of the mountain, and $\frac{3}{4}$ -mile east of where the road to Dripping Springs leaves the Blanco and Kyle road, on the Everett ranch. Loneman Mountain is made up of a series of terraces of rock, and the top is rather level and oval-shaped. The station is 51 paces from the north point of the oval, which is almost in line to Shingle Hills, 7 paces from the brow of the oval eastward, 19 paces from the brow southward, and $7\frac{1}{2}$ paces from the brow westward. The station is marked according to note 5. The reference mark is on the edge of an outcropping ledge of rock in the terrace below the top of the oval, 7 paces east of the extreme north edge of the oval, and 6 inches from the outer edge of the rock, about 5 feet below the station, and 3 feet below the north point of the oval, 33.369 meters (109.48 feet) from the station in azimuth $178^{\circ} 16' 31''$. The distances and azimuths of various points are: Church at Dripping Springs, 6 miles, $180^{\circ} 17' 38''$; east gable of Mr. Wood's house, $1\frac{1}{2}$ miles, $326^{\circ} 14' 33''$; north gable of Mr. Brook's house, 2 miles, $17^{\circ} 35' 20''$; East Twin Peak, 5 miles, $19^{\circ} 41' 05''$.

Carpenter (Hays County, Tex., O. W. Ferguson, 1903; 1904).—Four miles by road N. 75° W., from Buda, on what is known as "Carpenter Hill," in a rocky pasture about 18 meters north of the Buda and Blanco City wagon road, on the land of Mrs. Harrison and her children, who live about 200 meters north by east from the station and upon the same hill. The station is marked according to note 3. The reference mark is at the north side of the wagon road, 0.32 meter on the field side of the wire fence and distant 57.574 meters (188.89 feet) from the station in azimuth $276^{\circ} 47' 39''$. The center of the stone chimney at the east end of Mrs. William Hancock's house is distant about 70 meters southwest, in azimuth $36^{\circ} 47' 45''$; the end of the ridge of the south gable of the house of Capt. Fred Cocker is about $1\frac{1}{2}$ miles north, in azimuth $172^{\circ} 58' 49''$; the west stone chimney of Mr. S. H. Niven's house, distant about 1 mile, is in azimuth $239^{\circ} 08' 06''$.

Krueger (Hays County, Tex., O. W. Ferguson, 1903; 1904).—Seven miles by road southwest of Kyle and 7 miles by road northwest of San Marcos, on the ranch of W. M. Krueger, on the highest part of a high, rocky, rounded hill partly covered with brush, oak, and cedar. The station is marked according to note 3, except that the lower pipe is only 6 inches long, and the reference mark is as described below. The reference mark is on the highest and most prominent hard limestone rock 17.598 meters (57.74 feet) from the station, in azimuth $145^{\circ} 08' 17''$, and is a $\frac{3}{4}$ -inch hole $1\frac{3}{4}$ inches deep surrounded by a triangle 4 inches on a side, the apex toward the station. Distances and azimuths to various points are as follows: Mr. Krueger's house, center of chimney, about 200 meters, $170^{\circ} 44' 07''$; a large windmill tower in a pasture, $\frac{3}{4}$ mile, $59^{\circ} 02' 15''$; Park's cabin, center of the stone chimney at the east end, $\frac{1}{2}$ mile, $120^{\circ} 14' 47''$.

Hugo (Hays County, Tex., W. H. Burger, 1903).—Two miles by road northwest of Hugo, about 15 miles by road west of San Marcos, about $\frac{1}{2}$ mile north of the San Marcos, Hugo, and Blanco City wagon road, about 200 paces W. 25° S. (magnetic) from the place where the road from Wimberly to Hugo, on crossing the ridge, passes around the last "draw," which is very large and extends eastward, and about 300 paces W. 5° S. (magnetic) from where this road meets and follows closely the east property line fence on the top of the ridge. The station is about $\frac{1}{2}$ mile to the northward of the house of Mr. Rolfe, in the Williamson pasture, on a hill covered with cedar and oak and plenty of rocks, known as the "Devil's Backbone," near the southeast edge of a rather open but exceedingly rocky clearing. The station can probably always be found by the seven very large piles of rocks which were used as anchors to the legs of the tower. The station is marked according to note 5. The reference mark is on the highest point of a large rock whose top is from 6 to 8 inches above the neighboring rocks and 2.4 feet higher than the station, 29.751 meters (97.61 feet) from the station in azimuth $113^{\circ} 48' 34''$. The reference mark is witnessed by three nails driven in a blaze $1\frac{1}{2}$ feet above ground on a cedar tree (6 inches in diameter at the blaze), which is N. $68^{\circ} 30'$ E. (magnetic), and 3.51 meters from the reference mark. Distances and azimuths to various points are: West chimney of Mr. Williamson's house, 1 mile, $296^{\circ} 47' 26''$; west gable of old deserted house, $\frac{3}{4}$ mile, $309^{\circ} 32' 15''$; center of the tower of Mr. Rolfe's windmill, $\frac{1}{2}$ mile, $327^{\circ} 52' 53''$; East Twin Sister Peak, $198^{\circ} 42' 45''$; west edge of the stone building, Wimberly post office, $215^{\circ} 42' 59''$. Three nails were driven into a blaze about 2 feet from the ground in the north half of a double Spanish oak tree, which bears S. 44° W. (magnetic), and is 20.62 meters (67.7 feet) from the station.

Gus (Comal County, Tex., O. W. Ferguson, 1903; 1904).—Nine miles by road from New Braunfels, about 3 miles in a straight line a little south of west from the village of Hunter on the International & Great Northern Railway, and 1 mile east of the New Braunfels and Blanco City wagon road, on the ranch owned by Gus Pfeuffer and about 380 meters from his house, on a high, rocky, rounding timbered knoll, about 20 feet north of the crest. The station is marked according to note 4, and the reference mark is at the south side of an old road, distant 53.348 meters (175.03 feet) in azimuth $114^{\circ} 48' 13''$. Distances and azimuths to various points are: Windmill tower at farm, $2\frac{1}{2}$ miles, $310^{\circ} 37' 59''$; windmill tower at house in the woods, $2\frac{3}{4}$ miles, $325^{\circ} 31' 18''$; east gable of a large white house, about 3 miles, $18^{\circ} 21' 58''$.

Tieken (Guadalupe County, Tex., O. W. Ferguson, 1903; 1904).—About $10\frac{1}{2}$ miles N. 51° W. from Seguin, Tex., and about $8\frac{1}{2}$ miles direct and 11 miles by road N. 80° E. from New Braunfels, on the land of D. Tieken, upon high ground, in an open field. The station is marked according to note 3. The reference mark is at the corner of the fence at the south edge of the field and at the north edge of the brush, 0.6 meter north and 0.17 meter west of the corner post and 114.112 meters (374.38 feet) from the station in azimuth $223^{\circ} 26' 50''$. Distances and azimuths to various points are: Chimney of Christian Brown's house, about $1\frac{1}{4}$ miles, $133^{\circ} 51' 46''$; chimney of Mr. Tieken's house, about 700 meters, $256^{\circ} 19' 15''$.

Seguin west base (Guadalupe County, Tex., S. Forney, 1899; 1903).—About $6\frac{1}{2}$ miles by road southeast of New Braunfels, about $\frac{2}{3}$ mile south of the Seguin and New Braunfels road, on land owned by Mrs. Henry Steinmeier, who lives $\frac{1}{2}$ mile east. The station is on a small rise in small mesquite brush about 250 meters S. 20° W. (magnetic) from the southwest corner of the cotton field of Mrs. Steinmeier, and 130 paces at right angles (east) from the fence line leading from the above-mentioned corner southward to Guadalupe River which is about $\frac{1}{4}$ mile distant; the fence line meets the lane which runs to a small boat ferry across the river. The station is marked by a millimeter hole in the center of a bronze station mark set in the top of a hard limestone block 23 inches square and 16 inches high, weighing 700 pounds, which is

embedded in a block of concrete 4 feet square and 4 feet deep. The bronze mark mentioned above is not the standard bronze tablet, but is similar in design, the top being 80 millimeters in diameter and having the letters "U. S. C. & G. S." cast on it. The underground mark is a millimeter hole in the center of a copper bolt set in a limestone block 6 inches square and 1 foot long, embedded in concrete, with the bolt 4 feet below the surface of the ground. Over the underground mark is a terra-cotta pipe 7 inches in diameter and 25 inches long, the top being covered with tin and embedded in the upper mass of concrete. The reference mark, described in note 3 except there is no nail at the center, is 1 foot lower than the station-mark, and 23.80 meters (78.1 feet) south of the station. Distances and azimuths to certain points are as follows: Flagstaff on the courthouse at New Braunfels, $129^{\circ} 51' 47''$; north gable of Peter Scheler's house, $\frac{3}{8}$ mile, $222^{\circ} 12' 08''$; south gable of Mrs. Steinmeier's house, $\frac{1}{4}$ mile, $263^{\circ} 58' 44''$; west gable of Frankfort school, $\frac{1}{2}$ mile, $269^{\circ} 20' 14''$.

Mission (Comal County, Tex., W. H. Burger, 1903).—On Mission Hill, 3 miles by road west of New Braunfels, on land owned by Frank Careth, about 40 paces N. 5° W. (magnetic) of the northwest corner of his house on the top of the same hill. It is identical with the U. S. G. S. Mission Hill, and is marked with their usual pipe which projects 0.85 foot above the ground. The tower is to be boarded up and used as a granary by Mr. Careth. The reference mark, described in note 3, is about the same elevation as the station, close to the fence line on the top of the hill, 2.2 feet west from the fence and 5.8 feet and 7.9 feet north and south, respectively, from two large trees near the tower to which the fence is nailed. Distances and azimuths to various points are as follows: Reference mark, 6.493 meters (21.30 feet), S. $22^{\circ} 45' E.$ (magnetic); south gable of Mr. Careth's house, about 50 paces, $0^{\circ} 40' 33''$; flagpole on the courthouse at New Braunfels, $2\frac{1}{2}$ miles, $288^{\circ} 09' 01''$; standpipe of the city water tower, New Braunfels, $2\frac{3}{4}$ miles, $295^{\circ} 38' 01''$.

Seguin east base (Guadalupe County, Tex., S. Forney, 1899; 1904).—About 9 miles S. $77^{\circ} E.$ from New Braunfels and about 9 miles N. $12^{\circ} W.$ from Seguin, Tex.; $\frac{3}{4}$ mile east of the New Braunfels and Beckman Gin road, upon the old Henry Loeffe, sr., farm now owned by William Loeffe, who lives 2 miles north. The station is in a mesquite pasture about 130 feet east of a cluster of large live oak trees and about 80 meters northwest of the "tank" or pond for watering stock. The station was marked in the same way as *Seguin west base*, except the underground mark is a copper bolt cemented into the natural sandstone rock about 32 inches below the surface, and the mass of concrete in which the capstone was set was kept clear of the bolt by means of a box 9 inches square. The reference mark is at the northwest corner of the pasture, 0.69 meter east of the west fence and 0.66 meter south of the north or lane fence, and 260.977 meters (856.22 feet) from the station in azimuth $113^{\circ} 02' 44''$. Distances and azimuths to various points are as follows: Chimney at the west end of H. Bading's house, about 1400 meters, $344^{\circ} 50' 11''$; chimney of N. Braunholze's house, about 1100 meters, $16^{\circ} 08' 28''$; chimney on the north side of H. Henze's house, about 300 meters, $108^{\circ} 42' 17''$.

Mott (Guadalupe County, Tex., O. W. Ferguson, 1903; 1904).—Two miles north of the courthouse in Seguin and 1 mile north of the Southern Pacific Railroad depot, on the west side of the Seguin and Geronimo wagon road, 1.29 meters east of the wire fence on the west side of the road. The station is marked according to note 3, and the reference mark is at the wire fence at the east side of the road 17.842 meters (58.54 feet) from the station in azimuth $272^{\circ} 03' 12''$. Distances and azimuths to various points are as follows: West tile chimney of Mrs. Schrom's house, about $\frac{3}{4}$ mile, $5^{\circ} 02' 55''$; Mrs. Wagner's windmill tower in a prominent cluster of live oak trees, about 300 meters, $204^{\circ} 18' 15''$; brick chimney of a house, about 450 meters, $282^{\circ} 51' 48''$.

Bear (Comal County, Tex., W. H. Burger, 1903).—Ten miles by road northwest of New Braunfels, 1 mile south of Bear Creek, and $\frac{1}{4}$ mile east of the New Braunfels, Bear Creek and Northwestern wagon road, on a hill covered with cedar, live oak, and plenty of rock, in a pasture belonging to the Borchers brothers, one of whom, Charles, lives about 3 miles southeast on the road to New Braunfels. The station is about $\frac{1}{4}$ mile east of the road from the top of the ridge where the gate gives entrance to the pasture. The lowest part of a large "basin" on the southeast side of the hill is almost directly in line to Mission Hill. Almost due east on the opposite side of a large "draw" about $\frac{1}{2}$ mile distant is a large spot on the side of the hill, noticeable because of its being almost devoid of trees. The station is marked according to note 5, and the reference mark, which is 22.864 meters (75.01 feet) from the station in azimuth $339^{\circ} 43' 58''$, is on the highest point of a large stone projecting about 8 inches above the surrounding rock. It is 1.8 feet lower than the station and is witnessed by three nails driven into a blaze 2 feet from the ground on about the largest cedar tree at the south

edge of the brow of the hill. This tree is 7.97 meters S. 12° W. (magnetic) from the reference mark. Distance and azimuths to various points are as follows: House of Charles Arnold, 4 miles, $354^{\circ} 39' 33''$; Mission Valley Church spire, 5 miles, $347^{\circ} 19' 50''$; barn of Albert Hartwig, $5\frac{1}{2}$ miles, $340^{\circ} 14' 08''$.

Herndon (Guadalupe County, Tex., W. H. Burger, 1903; 1904).—About $2\frac{1}{2}$ miles east of south of Marion, on the Southern Pacific Railroad, $\frac{1}{8}$ mile south of the Marion and Seguin wagon road in a pasture belonging to Mr. Krueger, who lives about 6 miles north of Marion. The station is on top of the hill known as Herndon Hill, which is covered with trees 20 or 30 feet high, at the south side of a slightly cleared space south of the old road to the top of the hill. The station is marked according to note 3, except that there is no reference mark. Trees were marked as follows: A 6-inch hickory 25 feet high, bearing S. $40^{\circ} 15'$ E. (magnetic), 14.02 meters distant, by 3 nails in a blaze, 2 feet from the ground; an 8-inch hickory about 18 feet high, bearing N. 66° W. (magnetic), 16.36 meters distant and just a few feet north of the old road, by a nail in the center of a triangle, $3\frac{1}{2}$ inches on a side, cut in a blaze 2 feet from the ground; an 8-inch scrub oak about 12 feet high north of the station and across the road, at the east side of the small clearing, bearing N. $5^{\circ} 30'$ W. (magnetic) and 30.92 meters distant, by 3 nails in a blaze $2\frac{1}{2}$ feet from the ground. *Herndon Hill, U. S. G. S.* (see below), is 4.309 meters, S. $58^{\circ} 30'$ E., from the station.

Central (Guadalupe County, Tex., O. W. Ferguson, 1903).—About $6\frac{1}{2}$ miles S. 50° W. from Seguin and about 125 meters north of the "South road" leading from Seguin to San Antonio, in a mesquite pasture, on land belonging to Mrs. Heinrich Beoker. The reference mark is between two large mesquite trees, 24.566 meters (80.56 feet) from the station, in azimuth $152^{\circ} 23' 11''$. These trees were marked by triangles cut into them. One, about 1 foot in diameter, is 1.831 meters northeast of the reference mark, and the other, about 7 inches in diameter, is 1.784 meters southwest. The chimney of a house about 800 meters distant is in azimuth $17^{\circ} 11' 22''$. The chimney of Mrs. Beoker's house, 140 meters distant, is in azimuth $128^{\circ} 22' 06''$. The east gable of Mrs. Beoker's new barn, at the end of the ridge about 100 meters distant, is in azimuth $141^{\circ} 13' 39''$.

Supplementary points.

Shingle Hill (U. S. G. S.) (near Travis and Hays County line, Tex., W. H. Burger, 1903).—Near *Shingle* (p. 54). The station is marked by a cross and the letters "U. S. G. S." cut on a large flat rock.

Shovel Mountain (U. S. G. S.) (Blanco County, Tex., W. H. Burger, 1903).—Near *Shovel* (p. 53). The station is marked by a large cairn of loose rock about 10 feet high and $4\frac{1}{2}$ feet in diameter. A smaller cairn placed also by the U. S. Geological Survey is on the east edge of the mountain about $\frac{3}{8}$ mile distant.

Cedar Hill (U. S. G. S.) (Hays County, Tex., O. W. Ferguson, 1903).—Near *Cedar* (p. 54). The station is marked by a rough flat stone about 1 foot square, the top 2 inches below the average surface of the ground and marked with a cross and the letters "U. S. G. S."

Herndon Hill (U. S. G. S.) (Guadalupe County, Tex., W. H. Burger, 1903).—Southeast of *Herndon* (above) and 2 feet west of an old dead tree. The station is marked by the usual iron pipe of the U. S. Geological Survey projecting 2 feet above the ground. It was found in good condition in 1903.

Austin latitude station (Travis County, Tex.; William Eimbeck, 1872).—Near the northeast corner of the public reservation, bounded on the north by College Avenue, on the west by Brazos Street, on the south by Mulberry Street, and on the east by an alley, and occupied (1872) by the General Land Office of the State of Texas, but in 1895 reported as practically in New Brazos Street. It was marked by a pier of cut-stone masonry, 18 by 22 inches, upon a rubble-masonry base extending 30 inches below the surface of the ground and resting on a solid layer of gravel. This pier forms the southern monument of the meridian line.

Austin north meridian (Travis County, Tex., William Eimbeck, 1872; 1903).—On Capitol Hill, a cross on the copper bolt in the center of the top of the square stone pillar marking the north end of the meridian line established in 1872.

Austin longitude station (Travis County, Tex., E. Smith, C. H. Sinclair, and G. R. Putnam, 1895; 1899).—In the grounds on the east side of the capitol. The station is marked by a pier.

SEGUIN TO ALICE, TEX.

Principal points.

Thomas (Guadalupe County, Tex., W. H. Burger, 1903; 1904).—Eleven miles by road S. 15° E. from Seguin, the nearest railroad town, 270 paces N. 82° E. (magnetic) from Thomas Springs (only a water hole), well known for miles around, and just inside the pasture of William Brodt, of Seguin, near the gate giving entrance to the pasture and the road leading to the house of William Oliver, who lives about $\frac{1}{4}$ mile east. The station is 74 paces S. 65° E. (magnetic) from the northwest corner post of the pasture. The hill is cleared, except for large trees, to the north and west pasture fences in the neighborhood of the station. Fine white sand is in abundance. The station is marked according to note 3. The reference mark (which has no nail) is about $1\frac{1}{2}$ feet north of the north fence line of the pasture, 82 paces east along the fence line from the northwest corner near the gate, 50.873 meters (166.91 feet) N. 10° E. (magnetic) from the station, and about $\frac{1}{2}$ foot higher. The azimuth from the station of the west gable of James Pruitt's house is 82° 18' 20'', and of the west gable of William Oliver's house 273° 27' 14''.

Lavernia (Wilson County, Tex., O. W. Ferguson, 1904).—About $3\frac{3}{4}$ miles by road southwest from Lavernia, in the Howard pasture on the southern end of a sand ridge covered with oak, hickory trees, and brush. The station is marked according to note 3, the reference mark being 30.071 meters (98.66 feet) from the station in azimuth 158° 50' 13''. Other distances and azimuths from the station are as follows: Three post-oak trees deeply marked with 6-inch triangles on the sides facing the station—one 11 inches in diameter, 16.33 meters, 292°; one 7 inches in diameter, 15.63 meters, 336°; and one 16 inches in diameter, 5.02 meters, 92°; large stone chimney of a dwelling house beyond Lavernia, about 4 miles, 222° 38' 39''; stone chimney of dwelling house, about 3 miles, 73° 37' 22''.

Stockdale (Wilson County, Tex., W. H. Burger, 1904).—Two miles northeast of the town of Stockdale, about 200 meters south of the Stockdale and Union Valley road and almost in the center of a large cotton field belonging to Mr. Richard Strand, who lives in the edge of the field about 250 meters northeast of the station. The station is marked according to note 3. The reference mark, which is practically at the same elevation as the station, is 20.542 meters (67.39 feet) from the station in azimuth 345° 18' 12''. The following azimuths are from the station: Northeast gable of Mrs. M. S. West's house, distant $\frac{1}{4}$ mile, 18° 21' 55''; spire of Stockdale public school, 59° 29' 52''; south gable of Mr. Strand's house, distant $\frac{1}{8}$ mile, 231° 29' 54''; south gable of Nat Luker's house, distant $\frac{1}{4}$ mile, 329° 09' 47''. From the reference mark the azimuths of these objects are as follows: Northeast gable of Mrs. M. S. West's house, 19° 52' 50''; spire of Stockdale public school, 59° 48' 55''; south gable of Mr. Strand's house, 228° 25' 00''; south gable of Nat Luker's house, 328° 43' 43''.

Serita (Wilson County, Tex., O. W. Ferguson, 1904).—About $1\frac{1}{2}$ miles S. 72° W. from the Marcelena post office, $4\frac{1}{2}$ miles N. 40° E. from Floresville, and about 125 meters northwest from the Floresville and Marcelena wagon road, upon what is known as Serita Hill, on land owned by Mr. James, of Floresville, and rented in 1903 by G. W. Holder. The station is marked according to note 3. The reference mark is 13.010 meters (42.68 feet) from the station in azimuth 349° 45' 53''. An oak tree 17 inches in diameter and bearing a 7-inch triangle cut in its side is 8.862 meters N. 33° W. from the station. A post-oak tree 1 foot in diameter is 4.308 meters N. 80° W. from the station. The following azimuths are from the station: Large stone chimney on the house of G. W. Holder, distant about $\frac{1}{4}$ mile, 61° 04' 28''; stone chimney on house of Clarence Noble, distant about 700 meters, 85° 33' 21''; brick chimney on house of Sam Newman, distant about 1 mile, 123° 09' 31''.

Karnes (Karnes County, Tex., W. H. Burger, 1904; 1905).—About $\frac{3}{4}$ mile southwest of Karnes City, 125 paces south of the Karnes City and Campbellton wagon road, on land belonging to Robert Salge, 26.91 meters (88.3 feet) from the southwestern gable of his house and 16.93 meters (55.5 feet) southwest of the southwest corner of his yard. The azimuth of the southwest gable of Mr. Salge's house from the station is 253° 18' 20''. The station is marked according to note 3. The reference mark is near the southeast corner of Mr. Salge's yard, 0.08 meter from the east fence, 0.46 meter from the south fence, and 30.024 meters (98.50 feet) from the station in azimuth 283° 08' 51''. The latitude station established in 1905 was 4.84 meters due east of the triangulation station and was marked by a pier built of wooden posts.

Ruckman (Karnes County, Tex., W. H. Burger, 1904).—About 14 miles by road northeast of Karnes City, 7 miles northeast of Helena post office, and 3 miles east by

south of Radford post office, in a 7000-acre pasture owned by John Ruckman, postmaster and merchant in Helena. The station is 402 paces east of the corner at a gate on the Riddleville-Runge road, 2 miles south of the house of W. H. Patten, and 95 paces from the Helena and Gonzales wagon road leading through the pasture; these two roads meet about 300 feet south of the station. The station is marked as in note 3, the reference mark being 37.478 meters (122.96 feet) from the station in azimuth $177^{\circ} 10' 33''$. The following azimuths are from the station: Southwest gable of August Wagonshein's house, distant $2\frac{1}{2}$ miles, $195^{\circ} 07' 19''$; chimney on Albert Gerhart's house, distant 2 miles, $265^{\circ} 03' 11''$; tall gatepost 2 miles south of W. H. Patten's, distant 95 paces, $93^{\circ} 10' 17''$; smokestack on cotton gin at Radford post office, distant 3 miles, $114^{\circ} 25' 48''$.

Choate (Karnes County, Tex., W. H. Burger, 1904).—About 12 miles by road southeast of Kenedy, $3\frac{1}{2}$ miles by road south of Choate post office, and $\frac{1}{2}$ mile southwest of Mr. W. R. Scogin's house, in a pasture owned by Mrs. McKenney, or her daughter, Mrs. W. R. Scogin. The station is on the highest part of a small hill covered with brush and about 415 paces west by south from the gate leading from Mrs. Scogin's house lot into the pasture. The station is marked according to note 3. The reference mark is about 2 feet lower than the station and 17.830 meters (58.50 feet) from it in azimuth $269^{\circ} 15'$. The following azimuths are from the station: Chimney of W. R. Scogin's house, distant 500 yards, $200^{\circ} 04' 45''$; chimney of J. L. Teas's house, distant $\frac{3}{4}$ mile, $227^{\circ} 48' 42''$; chimney of Oscar Davenport's house, distant 1 mile, $309^{\circ} 27' 46''$; smokestack on gin at Choate post office, distant 3 miles, $162^{\circ} 47' 57''$.

Bryde (Karnes County, Tex., W. H. Burger, 1904).—About $6\frac{1}{2}$ miles by road south west of Kenedy, in and near the south side of a pasture belonging to D. McBryde and about $\frac{3}{4}$ mile south of his house. The station is on a ridge which is 5 minutes' walk almost due east from a large tank on a draw $\frac{1}{2}$ mile southeast of McBryde's house. The station is marked according to note 3. The reference mark is 36.235 meters (118.88 feet) from the station in azimuth $275^{\circ} 13' 04''$, and 24.006 meters (78.76 feet) west of the fence separating McBryde's pasture from the cotton field of T. D. Packett at a point 90 meters south from the gate in the fence. The following azimuths are from the station: T. D. Packett's windmill, distant $\frac{3}{4}$ mile, $280^{\circ} 34' 23''$; Mrs. Andy William's windmill, distant $\frac{3}{4}$ mile, $343^{\circ} 48' 10''$; largest chimney on the house of D. McBryde, distant $\frac{3}{4}$ mile, $158^{\circ} 57' 41''$.

Pettus (Bee County, Tex., W. H. Burger, 1904).—About $2\frac{1}{2}$ miles northeast of Pettus on a brush and timber covered ridge in a pasture owned by George A. Ray, who lives 1 mile southwest of Pettus. The station is $1\frac{1}{2}$ miles by road southwest of Sam Porter's house, 17 paces north of the wagon road from his place to Pettus and 18 meters north of a fence. The station is marked according to note 3. The reference mark is just inside the fence line at the same elevation as the station and 38.740 meters (127.10 feet) from it in azimuth $4^{\circ} 29' 20''$. The azimuth from the station to the west chimney of Bob McKenney's house, distant $\frac{3}{4}$ mile, is $202^{\circ} 48' 06''$, and to the chimney over the west gable of Sam Porter's house is $225^{\circ} 48' 18''$.

Borroum (Bee County, Tex., W. H. Burger, 1904).—About 2 miles south of Caesar post office, $\frac{1}{2}$ mile east of the road from Caesar post office to Mineral post office, and about 7 miles by road west of Pettus, on a brush-covered ridge in a large pasture owned by Mr. P. Borroum and 1 mile south of his house. The station is on the highest part of a semibare spot on the crest of the ridge, which is surrounded by large live oak trees. It is marked according to note 3. The reference mark is at practically the same elevation as the station and 35.340 meters (115.94 feet) from it in azimuth $181^{\circ} 29' 51''$. The following azimuths are from the station: Rutherford's windmill, distant $1\frac{1}{2}$ miles, $63^{\circ} 04' 58''$; Caesar post-office chimney, distant 2 miles, $181^{\circ} 13' 36''$; windmill of Mr. Borroum, in pasture near tank, $192^{\circ} 24' 33''$; chimney on Will Fox's house, distant $\frac{3}{4}$ mile, $314^{\circ} 43' 03''$.

Wiess (Bee County, Tex., W. H. Burger, 1904).—About 11 miles by road north of Beville, $5\frac{1}{2}$ miles by road northeast of Normana, and 1 mile west of H. Philip's house, in a large pasture owned by V. Wiess, who lives in Beaumont. The Beville and Charco road passes through the eastern part of this pasture. The station is on a ridge covered with live oak trees and brush and forming the divide between Blanco and Medea Creeks. It was marked according to note 3. The reference mark is at the same elevation as the station, and 24.150 meters (79.23 feet) from it in azimuth $220^{\circ} 32' 35''$. The following azimuths are from the station: Cupola on ranch house (V. Wiess's Blanco farm), distant $1\frac{1}{2}$ miles; $251^{\circ} 08' 00''$; west gable of H. Philip's house, distant 1 mile, $287^{\circ} 29' 53''$; J. J. Berkland's house, distant $1\frac{1}{4}$ miles; $358^{\circ} 21' 01''$.

Fleming (Bee County, Tex., W. H. Burger, 1904).—Eleven miles by road N. 62° W. of Beville, 3 miles N. 38° E. of Cadiz post office, on a ridge covered with small brush

in a pasture belonging to the Flemings. To reach the station from Beeville, follow the Beeville and Mineral City wagon road for 7 miles to Carter's windmill, which stands close to and on the right-hand side of the road; pass through a gate on the left and opposite the windmill and follow the main road for 2 miles to a cross lane; turn to the right 200 yards and pass in a gate on the left at the house of William Chandler; follow the main road passing about 150 yards to the right of the house and go southwest about 1 mile, passing through two gates into the Fleming pasture. After passing through the second gate, turn to the right and the station is 1 mile distant on top of a ridge. The station is marked as in note 3. The reference mark is at the same elevation as the station and 27.385 meters (89.85 feet) from it in azimuth $166^{\circ} 56' 40''$. The following azimuths are from the station: Gin stack at Cadiz post office, distant 2 miles, $35^{\circ} 44' 43''$; east chimney of Howard West's house, distant $1\frac{1}{4}$ miles, $184^{\circ} 48' 40''$; Williams's gin stack, distant 1 mile, $244^{\circ} 02' 14''$; Beeville water tower, distant 8 miles, $289^{\circ} 26' 46''$; chimney of William Chandler's house, distant 2 miles, $289^{\circ} 57' 46''$.

Beeville (Bee County, Tex., W. H. Burger, 1904).—About $4\frac{1}{4}$ miles N. 25° W. from Beeville, east of the Beeville and Normana road, in a large pasture owned by Mrs. Little, who lives in Beeville. On account of the heavy sand this road separates near the station into two parallel roads, and the station is 94 paces east of the nearer and 132 paces east of the other of these two branches. To reach the station from Beeville, take the Beeville and Normana road, which, about $3\frac{1}{2}$ miles out, passes into Mrs. Little's pasture; go 1 mile farther along the road and the station will be on a ridge to the right, about $\frac{1}{4}$ mile from the point where the road crosses the railway track after passing the station. The station is marked as in note 3. The reference mark is 3 feet lower than the station and 47.098 meters (154.52 feet) from it in azimuth $7^{\circ} 02' 09''$. The following azimuths are from the station: Southeast gable of Sid. Dugat's barn, distant $\frac{1}{2}$ mile, $148^{\circ} 39' 12''$; tallest chimney on Mrs. Little's house, distant $\frac{5}{8}$ mile, $280^{\circ} 19' 08''$.

Miller (Bee County, Tex., W. H. Burger, 1904; 1906).—Nine miles by road S. 25° W. of Beeville, on the east fence line of the Beeville, Almos schoolhouse, and Mathis wagon road, on the west side of a large pasture owned by I. J. Miller, cashier of the Commercial Bank of Beeville. This pasture is known as the Berry pasture, having been owned until recently by P. H. Berry, proprietor of a livery and feed stable in Beeville. The station is 1.55 meters west of the east fence of the lane, 35.440 meters (116.27 feet) north of the south boundary of the Berry pasture, and 191 paces south of the gate opening into the pasture. To reach the pasture from Beeville, follow the road to Clareville for $4\frac{1}{2}$ miles to the second lane on the left, then go due south $4\frac{1}{2}$ miles to the station. The station is marked according to note 3. The reference mark is at the same elevation as the station, and 48.403 meters (158.80 feet) from it in azimuth $180^{\circ} 21' 40''$. The following azimuths are from the station: Southeast chimney of J. G. Roundtree's house, distant $1\frac{1}{4}$ miles, $56^{\circ} 32' 31''$; largest chimney on Bud Clare's house, distant $1\frac{1}{4}$ miles, $243^{\circ} 58' 21''$. In 1906 latitude observations were made on a wooden pier placed 4.50 meters due west of the triangulation station and very nearly in the center of the north and south lane.

O'Neill (Bee County, Tex., W. H. Burger, 1904).—Seven miles by road southeast of Beeville, on a ridge covered with brush and mesquite trees, 700 paces east of the San Antonio & Aransas Pass Railway, in a large pasture owned by George B. O'Neill, and $1\frac{1}{4}$ miles southwest of his house. The station is marked according to note 3. The reference mark is at the same elevation as the station and 31.037 meters (101.83 feet) from it in azimuth $122^{\circ} 26' 16''$. The following azimuths are from the station: Windmill on William O'Neill's ranch, distant $\frac{3}{4}$ mile, $36^{\circ} 39' 00''$; chimney on Vego Kohler's ranch house, distant $1\frac{1}{2}$ miles, $149^{\circ} 45' 45''$; George B. O'Neill's windmill, distant $1\frac{1}{4}$ miles, $216^{\circ} 06' 15''$.

Skelly (Bee County, Tex., W. H. Burger, 1904).—Nine miles by road S. 67° W. of Skidmore, $\frac{1}{2}$ mile south of J. M. Skelly's ranch house and in a pasture purchased from Mr. Skelly by Fritz Bremer. The station is located in a small inclosure in which stands a windmill; it is 52 meters northeast of the windmill, 126 paces north-northwest of Mr. Bremer's house, and 120 paces east of the gate on the west side of the lot leading to Mr. Skelly's house. The station is marked according to note 3. The reference mark, which is 0.50 meter west of the east fence of the inclosure, is at the same elevation as the station and 21.242 meters (69.69 feet) from it in azimuth $165^{\circ} 51' 26''$. The following azimuths are from the station: Windmill of Mrs. Brown (who lives in Mr. Skelly's house), distant $\frac{1}{4}$ mile, $170^{\circ} 23' 31''$; chimney on Fritz Bremer's house, distant 126 paces, $338^{\circ} 18' 20''$.

Welder (Bee County, Tex., W. H. Burger, 1904).—About 5 miles (7 miles by road) S. 25° E. of Skidmore, $2\frac{1}{2}$ miles south of the Corpus Christi branch of the San Antonio

& Aransas Pass Railway, 2 miles south of Pete Boale's house in a large pasture owned by J. J. Welder, who lives in Victoria and whose foreman in charge of the ranch is J. E. Sullivan, who lives 7 miles south of Skidmore. The station is about 300 paces east of the road leading south through the Welder pasture, which abounds in mesquite and live oak. To reach the station from Skidmore, follow the road along the south side of the Corpus Christi branch of the San Antonio & Aransas Pass Railway almost to milepost 4 from Skidmore, go through the wire gate to the south, then south about $\frac{3}{4}$ mile, and just before reaching the creek near Pete Boale's house turn to the right and pass through a wire gate, thence 2 miles south to the station, which is 63.50 meters from the large gate leading into a lot where the windmill and tank are located; this gate is 124 paces from the windmill. The station is marked according to note 3. The reference mark is at the same elevation as the station and 28.997 meters (95.13 feet) south of it.

Mathis (San Patricio County, Tex., W. H. Burger, 1904).—In the east corner of lot 10, block 15, of the village of Mathis, on land belonging to S. G. Borden, who lives in Sharpburg, Tex., and whose agent in Mathis is A. B. Watts, jr. The station is 5.14 meters northwest of the southeast fence line of the lot and 30.01 meters northeast of the southwest fence line; Bee Street runs along the southeast side of the lot and San Patricio Avenue along the southwest side. The station is 130 paces east of the railway track. The station is marked according to note 3. The reference mark is in the south corner of lot 10, 0.36 meter from the fence line of Bee Street, 0.79 meter from the fence line of San Patricio Avenue, and 29.542 meters (96.92 feet) from the station in azimuth $219^{\circ} 29' 47''$. Mathis railway station (ornament over gable facing railway track) is 144.46 meters from the station in azimuth $291^{\circ} 07' 29''$.

Nolan (San Patricio County, Tex., W. H. Burger, 1904).—Nine miles S. 65° E. from Mathis, $\frac{1}{4}$ mile north of the Mathis and Sinton wagon road, in a pasture owned by Christopher Nolan, who now lives in San Patricio. The station is 41.70 meters (136.8 feet) northwest of Mr. Nolan's ranch house, near his stock pens, 85 paces northwest of his windmill, and 6.75 meters north of the fence on the south side of the pasture. To reach the station from Mathis follow the Mathis and San Patricio road for about 4 miles to a large bridge, crossing which, take the middle of three roads, which in half a mile, just before reaching a farm house, branches, one branch going east and the other south along a lane; follow the south road, passing through a gate at its southern end, then take the left-hand road, which is the Sinton Road, and follow it for 4 miles to Mr. Nolan's house, where the station will be $\frac{1}{4}$ mile to the left. The station is marked as in note 3. The reference mark is 10.52 meters (34.5 feet) north of the gate leading from the stock pens to the pasture, 0.47 meter west of the east fence of the pasture in which the station is located, and 44.573 meters (146.24 feet) from the station in azimuth $238^{\circ} 49' 56''$. The following azimuths are from the station: Windmill in Harry Timon's pasture, distant $\frac{1}{2}$ mile, $29^{\circ} 08' 02''$; windmill in Welder pasture, distant 2 miles, $269^{\circ} 54' 57''$; Mr. Nolan's windmill, distant 85 paces, $309^{\circ} 29' 01''$.

Elliff (Jim Wells County, Tex., W. H. Burger, 1904; 1906).—Three miles north of Banquete, $\frac{1}{4}$ mile west of the Banquete and San Patricio wagon road, in a pasture near the stock pens of J. A. Elliff, and 50 paces west-southwest of his house. The station is between the stock pens and the house on the north, a cotton field on the south, and the large pasture of Mr. Elliff, leased to C. C. Wright, on the west. It is 5.85 meters north of the fence on the north side of the cotton field, 33.17 meters (108.08) feet east of the gate leading into the large pasture of Mr. Elliff on the west, 25.15 meters (82.51 feet) south of the stock pens, and 44.94 meters southwest of the southwest corner of Mr. Elliff's house. The station is marked according to note 3. The reference mark is at the same elevation as the station and 30.362 meters (99.61 feet) from it in azimuth $235^{\circ} 13' 11''$. The reference mark is located in the angle formed by the stock pens and house lot, and is 0.40 meter west of the house lot, 0.25 meter south of the stock-pen fence, and 15.17 meters (49.8 feet) southwest of the southwest corner of the house. The following azimuths are from the station: Southwest corner of J. A. Elliff's house, distant 44.94 meters (147.4 feet) $242^{\circ} 10' 06''$; chimney of C. C. Wright's house, distant $\frac{3}{4}$ mile, $307^{\circ} 49' 37''$; chimney on Banquete railway station, distant 3 miles, $358^{\circ} 02' 37''$.

Reynolds (Jim Wells County, Tex., W. H. Burger, 1904).—Three and one-half miles northeast of Alfred railway station, $\frac{1}{2}$ mile northeast of Reynolds switch, 339 paces east of the San Antonio & Aransas Pass Railway, in a pasture belonging to George J. Reynolds, and $\frac{3}{4}$ mile north of his house. The station is 27.52 meters (90.3 feet) west of the west fence of a cotton field and 352 paces north of its southwest corner. The station is marked according to note 3. The reference mark is at the

same elevation as the station, 0.30 meter west of the cotton-field fence and 27.221 meters (89.31 feet) from the station in azimuth $116^{\circ} 36' 41''$. The following azimuths are from the station: Chimney on Alfred railway station, distant $3\frac{1}{2}$ miles, $231^{\circ} 14' 06''$; chimney on E. E. Miller's house, distant $\frac{1}{2}$ mile, $101^{\circ} 51' 57''$; chimney on George J. Reynolds's house, distant $\frac{3}{8}$ mile, $192^{\circ} 47' 56''$.

Alice (Jim Wells County, Tex., W. H. Burger, 1904; 1906).—In the South Heights addition to the town of Alice, $\frac{1}{2}$ mile south of the Mexican National Railway track, about $\frac{1}{2}$ mile east of the San Antonio & Aransas Pass Railway track, on a vacant lot belonging to the Alice Land Co., of which F. B. Nayer is manager. The station stands close to the edge of Cactus Avenue, which runs east and west, but has not been fenced, and between King Street on the west and Wright Street on the east. The station is marked according to note 3. The reference mark is at the southwest corner of the house lot of Mrs. E. McKenzie, 0.23 meter south of the south fence of the lot, 0.70 meter east from its southwest corner, at the same elevation as the station, and 53.820 meters (176.57 feet) from it in azimuth $165^{\circ} 18' 14''$. The following azimuths are from the station: Chimney on F. W. Ellis's house, on opposite side of King Street, $56^{\circ} 23' 57''$; northeast fence corner of F. W. Ellis's house lot, distant 36.93 meters (121.2 feet), $59^{\circ} 58' 54''$; southeast corner post of vacant lot across King Street from Mrs. McKenzie's house, distant 61.88 meters (203.0 feet), $147^{\circ} 59' 14''$; south gable of Mrs. E. McKenzie's house $176^{\circ} 10' 51''$; Methodist Church spire $192^{\circ} 01' 36''$. In 1905 latitude observations were made on a pier built of wooden posts, boxed in, situated 9.03 meters due east of the triangulation station. The longitude station established in 1906 was 2.75 feet due north of the triangulation station, and was marked by a concrete pier 18 by 26 inches, $2\frac{1}{2}$ feet in the ground and $2\frac{3}{4}$ feet above the ground.

Wood (Jim Wells County, Tex., W. H. Burger, 1904).—Nine miles S. 87° E. of Alice, $3\frac{1}{2}$ miles south of the Mexican National Railway, in a large pasture owned by John H. Wood who lives in Beeville and leased to a Frank A. Welder, of Victoria. The station is near a windmill and circular tank in the pasture, being 35.73 meters (117.2 feet) from the windmill, in azimuth $25^{\circ} 27' .9$, and 22.50 meters (73.8 feet) from the nearest edge of the tank. The tank and windmill are on a small ridge and are inclosed in a fence. The station is marked according to note 3. The reference mark is in the south corner of the inclosure in which the windmill stands, 2.87 meters from the windmill, and 33.738 meters (110.69 feet) from the station in azimuth $209^{\circ} 15'$. The following azimuths are from the station: Alice Methodist Church spire, $101^{\circ} 20' 46''$; chimney on large ranch house, distant 4 miles, $9^{\circ} 33' 45''$.

Alice east base (Jim Wells County, Tex., S. Forney, 1899; 1904).—About $10\frac{1}{2}$ miles by road southeast of Alice, 2 miles east of the Alice and Brownsville road in one of the King pastures on a slight elevation. To reach the station from Alice, follow the Brownsville road for $8\frac{1}{4}$ miles to a point $\frac{1}{4}$ mile beyond the gate leading west to Joe Garcia's and about $\frac{1}{2}$ mile nearer than the gate beyond the bridge at the end of the lane; go through the fence and proceed almost due east to the east side of the pasture owned by the Garcia Bros.; pass through a gate, and the station is $\frac{1}{2}$ mile distant on a slight elevation. The underground stone is 6 inches square and 12 inches long, embedded in concrete with its top 24 inches below the top of the surface stone. This surface stone is of limestone, 24 inches square and 14 inches deep, and is embedded in a mass of concrete 48 inches square and 22 inches deep. In each stone the exact center of the station is marked by a station mark composed of copper and brass and having a shank 7.6 centimeters long with a slit in its lower end, into which a brass wedge is inserted, so that when the bolt is driven home it bulges at the bottom of the hole, which is made larger there than at the top, and in this manner the mark is securely fastened in place. The top of the station mark is 80 millimeters in diameter, with an inner circle (countersunk) 37 millimeters in diameter. The letters "U. S. O. & G. S." are cast on the space between the inner and outer circles. The station mark in the underground stone is protected by a wooden box. The reference mark, described in note 3, is at the same elevation as the station and 20.765 meters (68.13 feet) from it in azimuth $351^{\circ} 41' 20''$. The following azimuths are from the station: Joe Garcia's windmill, distant $4\frac{1}{2}$ miles, $91^{\circ} 15' 27''$; Alice Methodist Church spire, $142^{\circ} 29' 27''$; chimney on large ranch house, distant $1\frac{1}{2}$ miles, $256^{\circ} 54' 28''$.

Alice west base (Jim Wells County, Tex., S. Forney, 1899; 1904).—Eleven miles by road from Alice, $3\frac{1}{2}$ miles west of the Brownsville and Alice wagon road, on that part of the Coloraras ranch belonging to Luciano Garcia and about 300 yards northeast of his house. To reach the station from Alice, follow the Brownsville road, which runs S. 30° E., for 8 miles to a gate leading west to Joe Garcia's house; this gate is 438 meters north of the base line where it crosses the Brownsville road. Passing through the gate go westward about $3\frac{1}{2}$ miles, past the house of Joe Garcia, to the top of a small ridge

on which is the station. The station is marked in a manner similar to Alice east base. The reference mark, similar to the one described in note 3, is at the same elevation as the station and 36.335 meters (119.21 feet) from it in azimuth $197^{\circ} 54' 54''$; it is 18 paces south of the wagon road leading south to several Mexican shacks. The following azimuths are from the station: North gable Mexican shack, distant $\frac{1}{8}$ mile, $70^{\circ} 24' 07''$; north gable of ranch house, distant 3 miles, $155^{\circ} 53' 44''$; north chimney of Mexican shack, distant $\frac{1}{8}$ mile, $201^{\circ} 14' 48''$; Joe Garcia's windmill, distant $\frac{3}{8}$ mile, $262^{\circ} 49' 33''$.

Rogers (Nueces County, Tex., H. D. King, 1905).—Located $\frac{1}{4}$ mile south of Rogers railway station on the Texas Mexican Railway, 15.79 meters (51.8 feet) east of the board fence which is on the east line of the Driscoll ranch, 8.3 meters east of the center of the road leading south from Rogers, and 3 miles by wagon road or railroad east of Robstown, the junction point of the Mexican National and the St. Louis, Brownsville & Mexico Railways. The station is marked according to note 1. The reference mark is 8.3 meters east of the center of the road, 15.67 meters (51.4 feet) east of the Driscoll ranch line fence, and 25.76 meters (84.5 feet) from the station in azimuth $179^{\circ} 21' 21''$. The following azimuths are from the station: Southwest corner of section house, distant $\frac{1}{4}$ mile, $130^{\circ} 40' 32''$; Rogers stock pens, north post of chute, $175^{\circ} 33' 25''$; windmill at railway crossing, distant $2\frac{1}{2}$ miles, $264^{\circ} 21' 21''$; windmill, distant $1\frac{1}{2}$ miles, $275^{\circ} 34' 20''$; windmill, distant $\frac{1}{4}$ mile, $329^{\circ} 59' 20''$.

Kaleta (San Patricio County, Tex., H. D. King, 1905).—About 2 miles east of Kaleta post office, about 5 miles east of Sharpsburg, and 4 miles east of Angelita, a station on the St. Louis, Brownsville & Mexico Railway, in the middle of a small cleared space on a prominent brush-covered ridge in a pasture owned by Turner Bros. It is $\frac{1}{2}$ mile northeast of the Kaleta and Portland wagon road, $\frac{1}{2}$ mile east of Turner Bros.' windmill and 200 yards northeast of an old road leading from windmill to eastward along the top of the ridge. C. V. Turner can direct one to the station, which is marked according to note 1. The reference mark is 27.34 meters (89.7 feet) from the station in azimuth $175^{\circ} 11' 09''$. The following azimuths are from the station: Sharpsburg schoolhouse belfry, distant 5 miles, $99^{\circ} 51' 10''$; Angelita railway station, east gable, distant 4 miles, $103^{\circ} 02' 10''$; chimney of Turner Bros.' house, distant $\frac{3}{4}$ mile, $144^{\circ} 48' 03''$; chimney of R. E. Turner's house, distant $\frac{1}{2}$ mile, $169^{\circ} 27' 46''$; "Ratana" windmill, distant 8 miles, $225^{\circ} 51' 45''$.

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

CONVERSION TABLES.

Lengths—Feet to meters (from 1 to 1000 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	47.54889	6	62.78893
7	2.13360	7	17.37363	7	32.61367	7	47.85370	7	63.09373
8	2.43840	8	17.67843	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	67.66573
3	7.01041	3	22.25044	3	37.49047	3	52.73050	3	67.97053
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	27.73685	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 1000 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	137.76987
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	94.48810	360	109.72822	410	124.96825	460	140.20828
1	79.55296	1	94.79290	1	110.03302	1	125.27305	1	140.51308
2	79.85776	2	95.09770	2	110.33782	2	125.57785	2	140.81788
3	80.16256	3	95.40250	3	110.64262	3	125.88265	3	141.12268
4	80.46736	4	95.70730	4	110.94742	4	126.18745	4	141.42748
5	80.77216	5	96.01210	5	111.25222	5	126.49225	5	141.73228
6	81.07696	6	96.31690	6	111.55702	6	126.79705	6	142.03708
7	81.38176	7	96.62170	7	111.86182	7	127.10185	7	142.34188
8	81.68656	8	96.92650	8	112.16662	8	127.40665	8	142.64668
9	81.99136	9	97.23130	9	112.47142	9	127.71145	9	142.95148
270	82.29616	320	97.53620	370	112.77622	420	128.01626	470	143.25628
1	82.60097	1	97.84100	1	113.08102	1	128.32106	1	143.56108
2	82.90577	2	98.14580	2	113.38582	2	128.62586	2	143.86588
3	83.21057	3	98.45060	3	113.69062	3	128.93066	3	144.17068
4	83.51537	4	98.75540	4	113.99542	4	129.23546	4	144.47548
5	83.82017	5	99.06020	5	114.30022	5	129.54026	5	144.78028
6	84.12497	6	99.36500	6	114.60502	6	129.84506	6	145.08508
7	84.42977	7	99.66980	7	114.90982	7	130.14986	7	145.38988
8	84.73457	8	99.97460	8	115.21462	8	130.45466	8	145.69468
9	85.03937	9	100.27940	9	115.51942	9	130.75946	9	145.99948
280	85.34417	330	100.58420	380	115.82422	430	131.06426	480	146.30428
1	85.64897	1	100.88900	1	116.12902	1	131.36906	1	146.60908
2	85.95377	2	101.19380	2	116.43382	2	131.67386	2	146.91388
3	86.25857	3	101.49860	3	116.73862	3	131.97866	3	147.21868
4	86.56337	4	101.80340	4	117.04342	4	132.28346	4	147.52348
5	86.86817	5	102.10820	5	117.34822	5	132.58826	5	147.82828
6	87.17297	6	102.41300	6	117.65302	6	132.89306	6	148.13308
7	87.47777	7	102.71780	7	117.95782	7	133.19786	7	148.43788
8	87.78257	8	103.02260	8	118.26262	8	133.50266	8	148.74268
9	88.08737	9	103.32740	9	118.56742	9	133.80746	9	149.04748
290	88.39217	340	103.63220	390	118.87222	440	134.11227	490	149.35228
1	88.69698	1	103.93700	1	119.17702	1	134.41707	1	149.65708
2	89.00178	2	104.24180	2	119.48182	2	134.72187	2	149.96188
3	89.30658	3	104.54660	3	119.78662	3	135.02667	3	150.26668
4	89.61138	4	104.85140	4	120.09142	4	135.33147	4	150.57148
5	89.91618	5	105.15620	5	120.39622	5	135.63627	5	150.87628
6	90.22098	6	105.46100	6	120.70102	6	135.94107	6	151.18108
7	90.52578	7	105.76580	7	121.00582	7	136.24587	7	151.48588
8	90.83058	8	106.07060	8	121.31062	8	136.55067	8	151.79068
9	91.13538	9	106.37540	9	121.61542	9	136.85547	9	152.09548

Lengths—Feet to meters (from 1 to 1000 units)—Continued.

Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.
500	152.40030	560	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	580	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	217.62763
5	156.97231	5	172.21234	5	187.45237	5	202.69241	5	217.93243
6	157.27711	6	172.51714	6	187.75718	6	202.99721	6	218.23723
7	157.58191	7	172.82194	7	188.06198	7	203.30201	7	218.54203
8	157.88671	8	173.12674	8	188.36678	8	203.60681	8	218.84683
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	222.50444
1	161.84912	1	177.08915	1	192.32918	1	207.56922	1	222.80925
2	162.15392	2	177.39395	2	192.63398	2	207.87402	2	223.11405
3	162.45872	3	177.69875	3	192.93878	3	208.17882	3	223.41885
4	162.76352	4	178.00355	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	197.20599	7	212.44602	7	227.68605
8	167.03073	8	182.27076	8	197.51079	8	212.75082	8	227.99085
9	167.33553	9	182.57556	9	197.81559	9	213.05563	9	228.29565

Lengths—Feet to meters (from 1 to 1000 units)—Continued.

Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.
750	228.00046	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	292.60858
1	231.95326	1	247.19329	1	262.43332	1	277.67335	1	292.91338
2	232.25806	2	247.49809	2	262.73812	2	277.97815	2	293.21818
3	232.56286	3	247.80289	3	263.04292	3	278.28295	3	293.52298
4	232.86766	4	248.10770	4	263.34772	4	278.58775	4	293.82778
5	233.17246	5	248.41250	5	263.65252	5	278.89255	5	294.13258
6	233.47726	6	248.71730	6	263.95732	6	279.19735	6	294.43738
7	233.78206	7	249.02210	7	264.26212	7	279.50215	7	294.74218
8	234.08686	8	249.32690	8	264.56692	8	279.80695	8	295.04698
9	234.39166	9	249.63170	9	264.87172	9	280.11175	9	295.35178
770	234.69646	820	249.93650	870	265.17652	920	280.41655	970	295.65658
1	235.00126	1	250.24130	1	265.48132	1	280.72135	1	295.96138
2	235.30606	2	250.54610	2	265.78612	2	281.02615	2	296.26618
3	235.61086	3	250.85090	3	266.09092	3	281.33095	3	296.57098
4	235.91566	4	251.15570	4	266.39572	4	281.63575	4	296.87578
5	236.22046	5	251.46050	5	266.70052	5	281.94055	5	297.18058
6	236.52526	6	251.76530	6	267.00532	6	282.24535	6	297.48538
7	236.83006	7	252.07010	7	267.31012	7	282.55015	7	297.79018
8	237.13486	8	252.37490	8	267.61492	8	282.85495	8	298.09500
9	237.43966	9	252.67970	9	267.91972	9	283.15975	9	298.39980
780	237.74446	830	252.98450	880	268.22452	930	283.46455	980	298.70460
1	238.04926	1	253.28930	1	268.52932	1	283.76935	1	299.00940
2	238.35406	2	253.59410	2	268.83412	2	284.07415	2	299.31420
3	238.65886	3	253.89890	3	269.13892	3	284.37895	3	299.61900
4	238.96366	4	254.20370	4	269.44372	4	284.68375	4	299.92380
5	239.26846	5	254.50850	5	269.74852	5	284.98855	5	300.22860
6	239.57326	6	254.81330	6	270.05332	6	285.29335	6	300.53340
7	239.87806	7	255.11810	7	270.35812	7	285.59815	7	300.83820
8	240.18286	8	255.42290	8	270.66292	8	285.90295	8	301.14300
9	240.48766	9	255.72770	9	270.96772	9	286.20775	9	301.44780
790	240.79246	840	256.03250	890	271.27252	940	286.51255	990	301.75260
1	241.09726	1	256.33730	1	271.57732	1	286.81735	1	302.05740
2	241.40206	2	256.64210	2	271.88212	2	287.12215	2	302.36220
3	241.70686	3	256.94690	3	272.18692	3	287.42695	3	302.66700
4	242.01166	4	257.25170	4	272.49172	4	287.73175	4	302.97180
5	242.31646	5	257.55652	5	272.79655	5	288.03658	5	303.27661
6	242.62126	6	257.86132	6	273.10135	6	288.34138	6	303.58141
7	242.92606	7	258.16612	7	273.40615	7	288.64618	7	303.88621
8	243.23086	8	258.47092	8	273.71095	8	288.95098	8	304.19101
9	243.53566	9	258.77572	9	274.01575	9	289.25578	9	304.49581

Lengths—Meters to feet (from 1 to 1000 units).

[Reduction factor: 1 meter=3.28083333 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	485.40583	1	659.44750
2	6.56167	2	170.60333	2	334.64500	2	488.68667	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 1000 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	919.63333	330	1,082.67500	380	1,246.71667	430	1,410.75833	480	1,574.80000
1	921.91417	1	1,086.95583	1	1,249.99750	1	1,414.03917	1	1,578.08083
2	925.19500	2	1,090.23667	2	1,253.27833	2	1,417.32000	2	1,581.36167
3	928.47583	3	1,093.51750	3	1,256.55917	3	1,420.60083	3	1,584.64250
4	931.75667	4	1,096.79833	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 1000 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	1,643.09750	1	1,807.73917	1	1,971.78083	1	2,135.82250	1	2,299.86417
2	1,646.07833	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	1,653.64000	4	1,817.58167	4	1,981.62333	4	2,145.66500	4	2,309.70667
5	1,658.82083	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	1,774.93083	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 1000 units)—Continued.

Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.
750	2,460.62500	800	2,624.66007	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	2,683.72167	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	2,087.26417	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

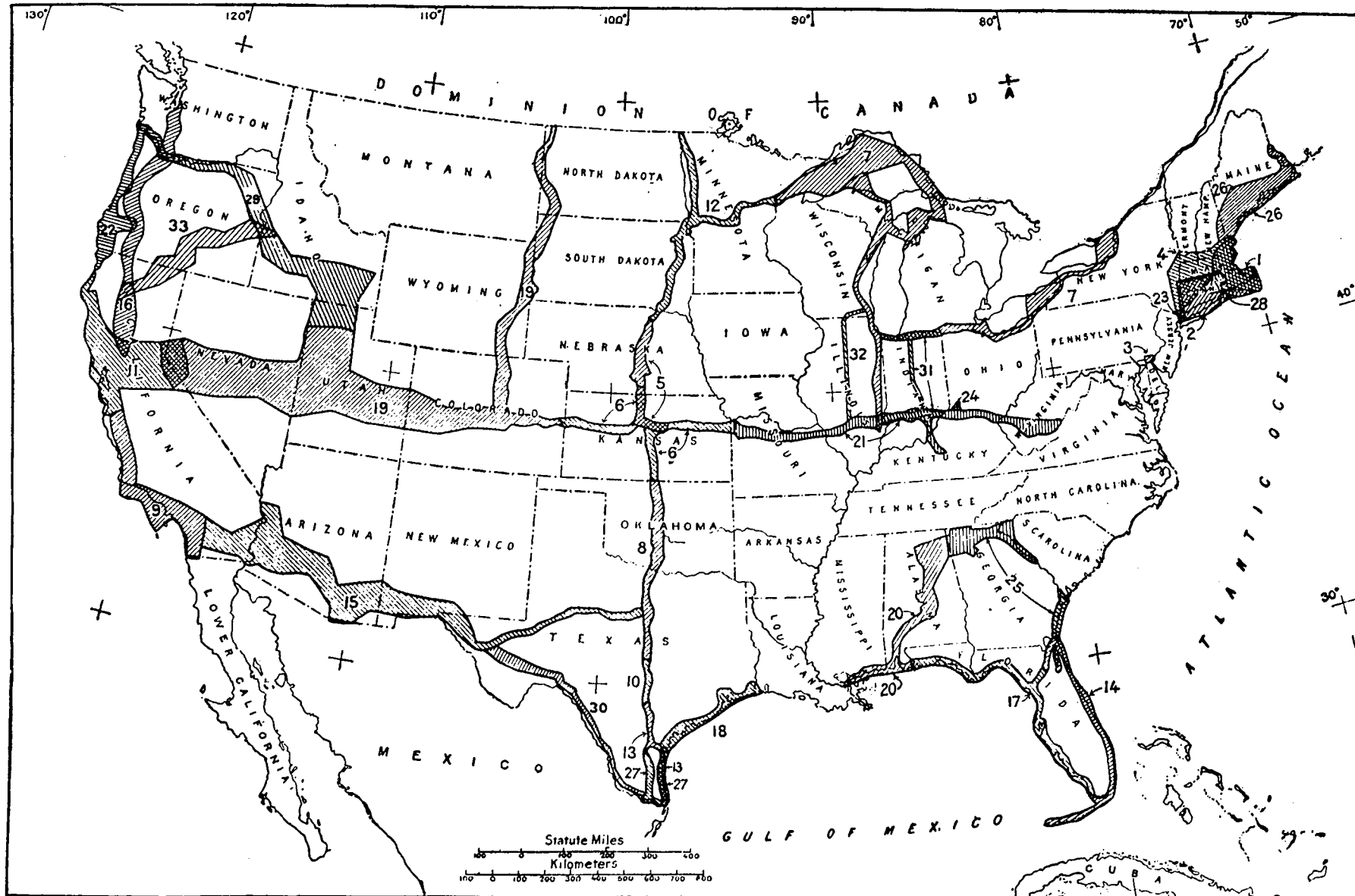


FIG. 2.—INDEX MAP SHOWING AREAS IN THE UNITED STATES COVERED BY PUBLISHED TRIANGULATION AND TRAVERSE WHICH HAVE BEEN RIGIDLY COMPUTED ON THE NORTH AMERICAN DATUM.

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Appendix 8, Report for 1885 (super-
seded by Special Publication No.
76).</p> <p>2. Appendix 8, Report for 1888.</p> <p>3. Appendix 8, Report for 1893.</p> <p>4. Appendix 10, Report for 1894 (super-
seded by Special Publication No.
76).</p> <p>5. Appendix 6, Report for 1901.</p> | <p>6. Special Publication No. 70.</p> <p>7. Appendix EEE, Annual Report of
the Chief of Engineers, 1902.</p> <p>8. Appendix 4, Report for 1903 (super-
seded by S. P. No. 88).</p> <p>9. Appendix 9, Report for 1904.</p> <p>10. Appendix 5, Report for 1905 (super-
seded by S. P. No. 88).</p> <p>11. Appendix 5 Report for 1910.</p> | <p>12. Appendix 4, Report for 1911.</p> <p>13. Appendix 5, Report for 1911 (super-
seded by S. P. No. 88).</p> <p>14. Appendix 6, Report for 1911.</p> <p>15. Special Publication No. 11.</p> <p>16. Special Publication No. 13.</p> <p>17. Special Publication No. 16.</p> <p>18. Special Publication No. 17.</p> <p>19. Special Publication No. 19.</p> | <p>20. Special Publication No. 24.</p> <p>21. Special Publication No. 30.</p> <p>22. Special Publication No. 31.</p> <p>23. Report on the triangulation of
Greater New York.</p> <p>24. Report on a plan of sewerage for
the city of Cincinnati.</p> <p>25. Special Publication No. 43.</p> <p>26. Special Publication No. 46.</p> | <p>27. Special Publication No. 54.</p> <p>28. Special Publication No. 62.</p> <p>29. Special Publication No. 74.</p> <p>30. Special Publication No. 78.</p> <p>31. Special Publication No. 79.</p> <p>32. Special Publication No. 86.</p> <p>33. Special Publication No. 84.</p> |
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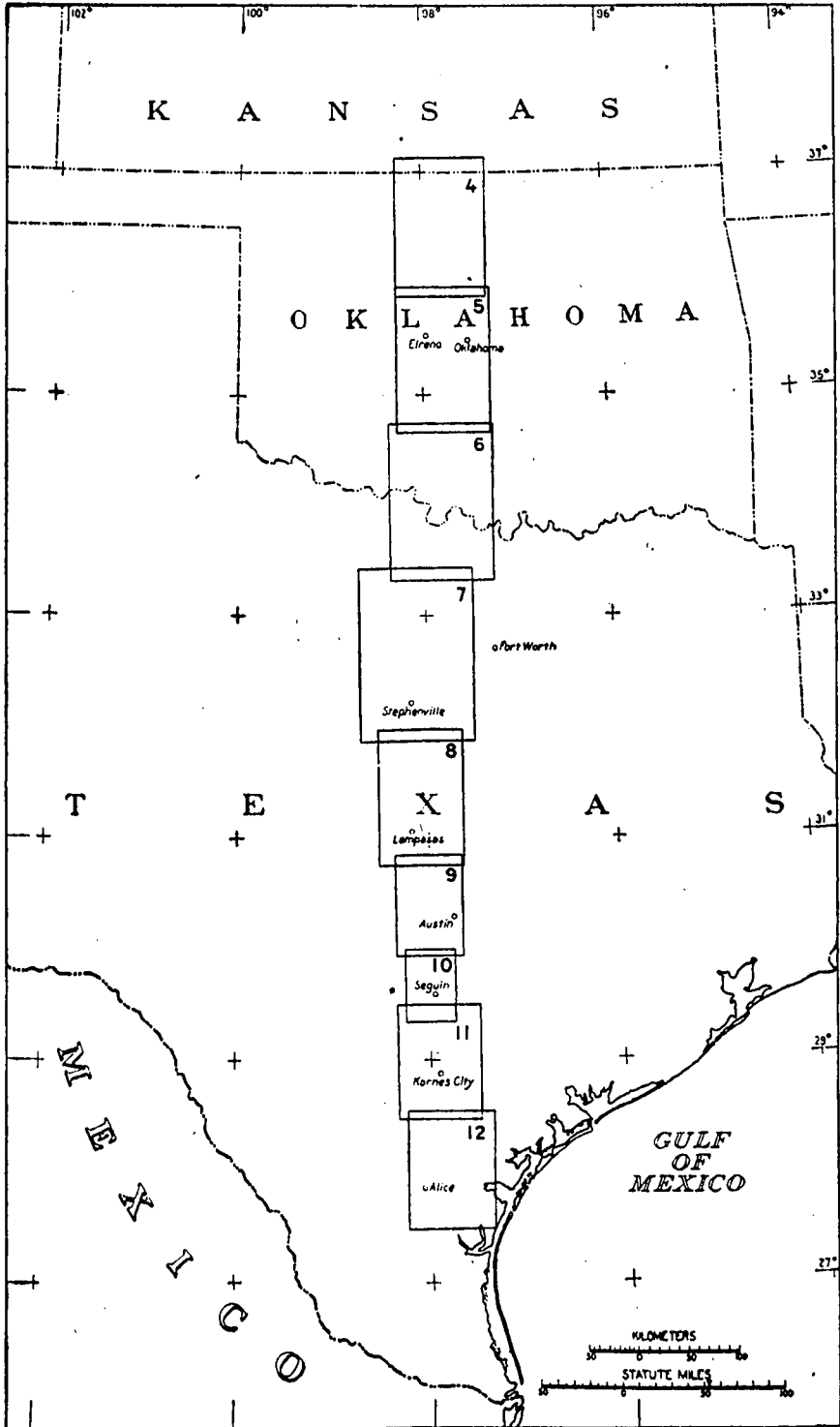


FIG. 3.—Index map showing the boundaries of each of the following sketches, Figs. 4 to 12.

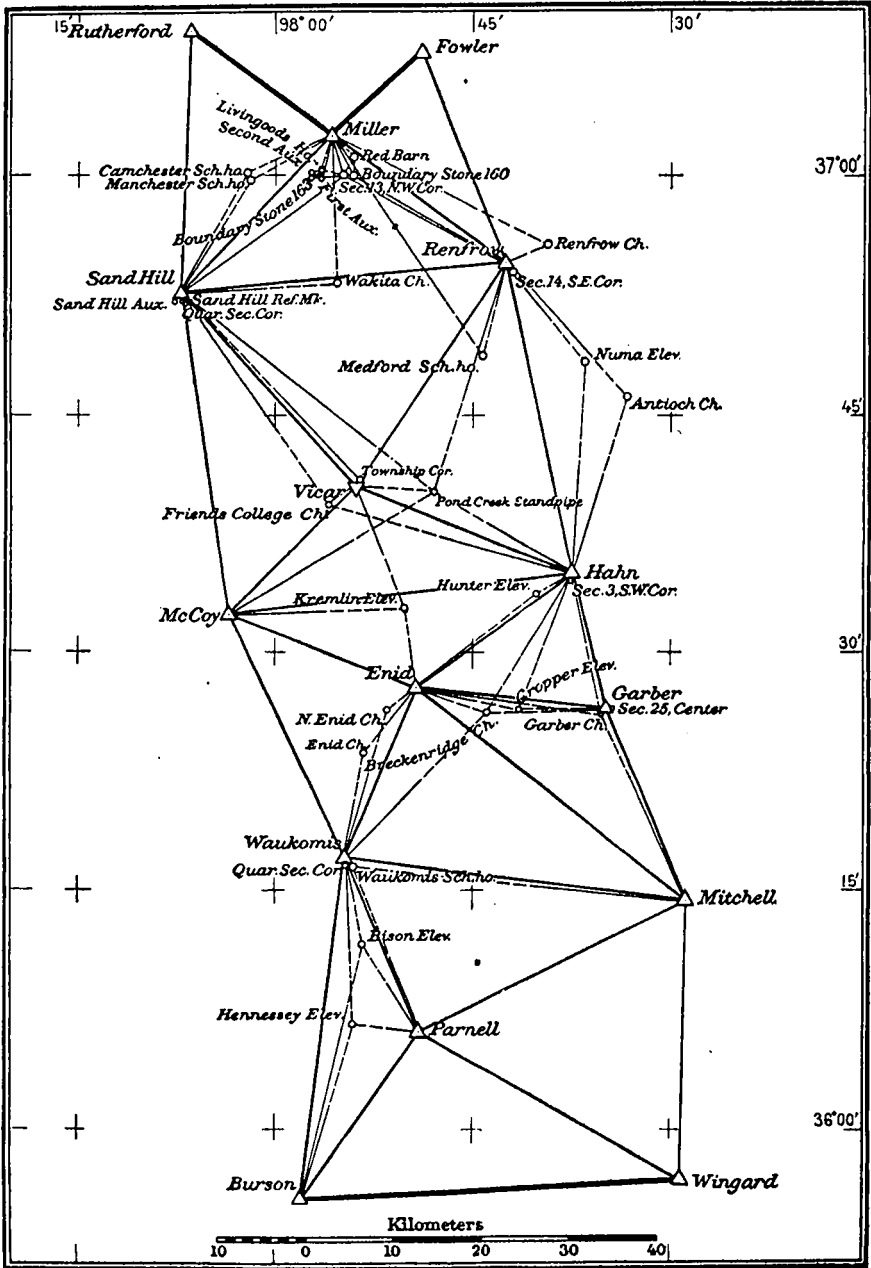


FIG. 4.—Precise triangulation, Kansas-Oklahoma boundary to Kingfisher, Okla.

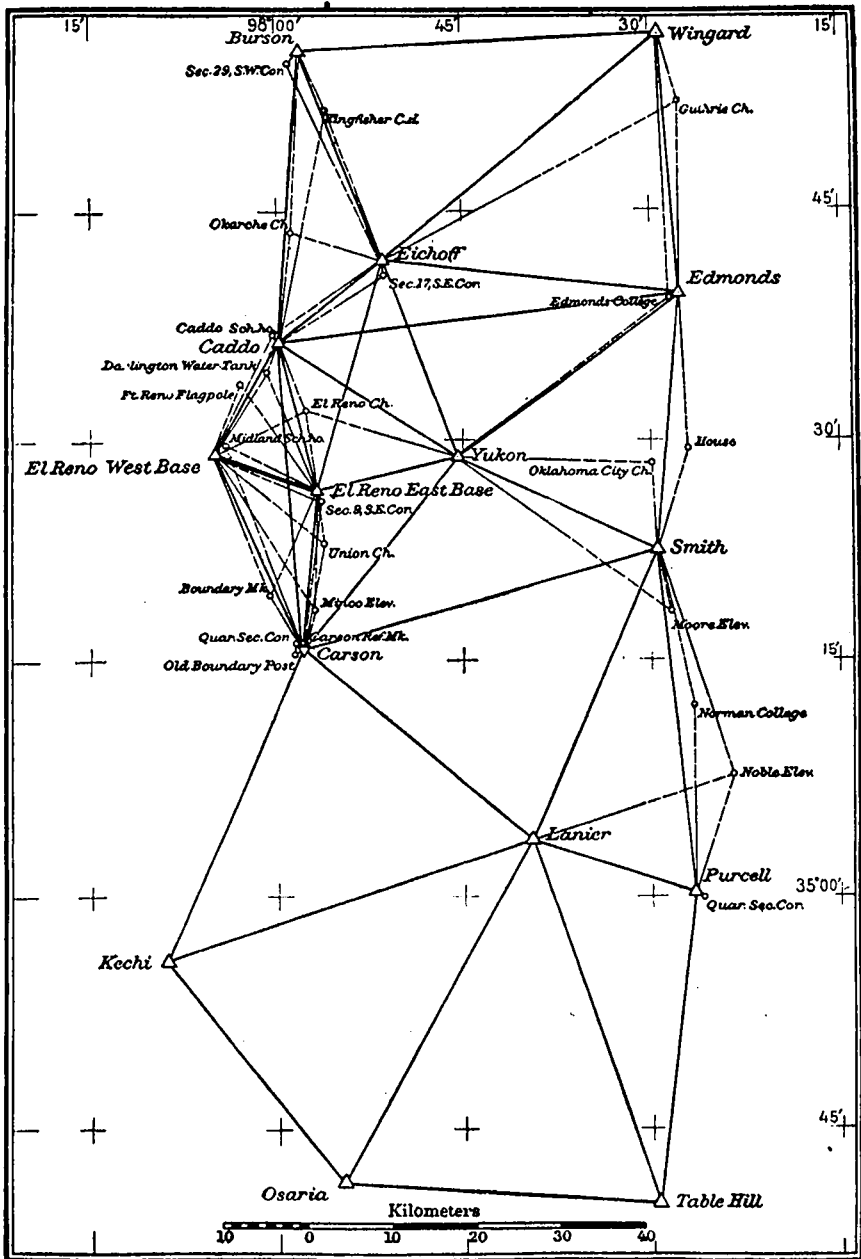


FIG. 5.—Precise triangulation, Kingfisher to Chickasha, Okla.

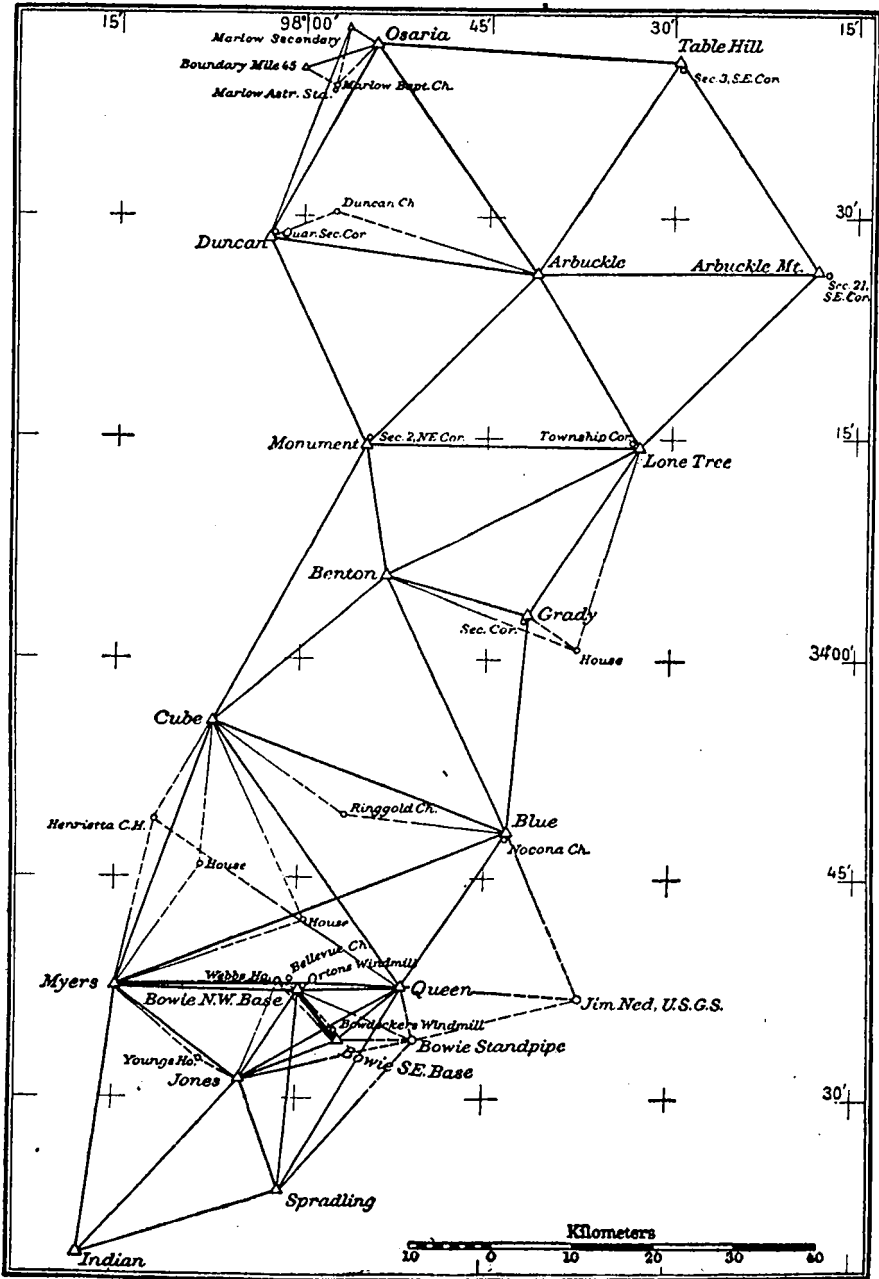


FIG. 6.—Precise triangulation, Chickasha, Okla., to Bowie, Tex.

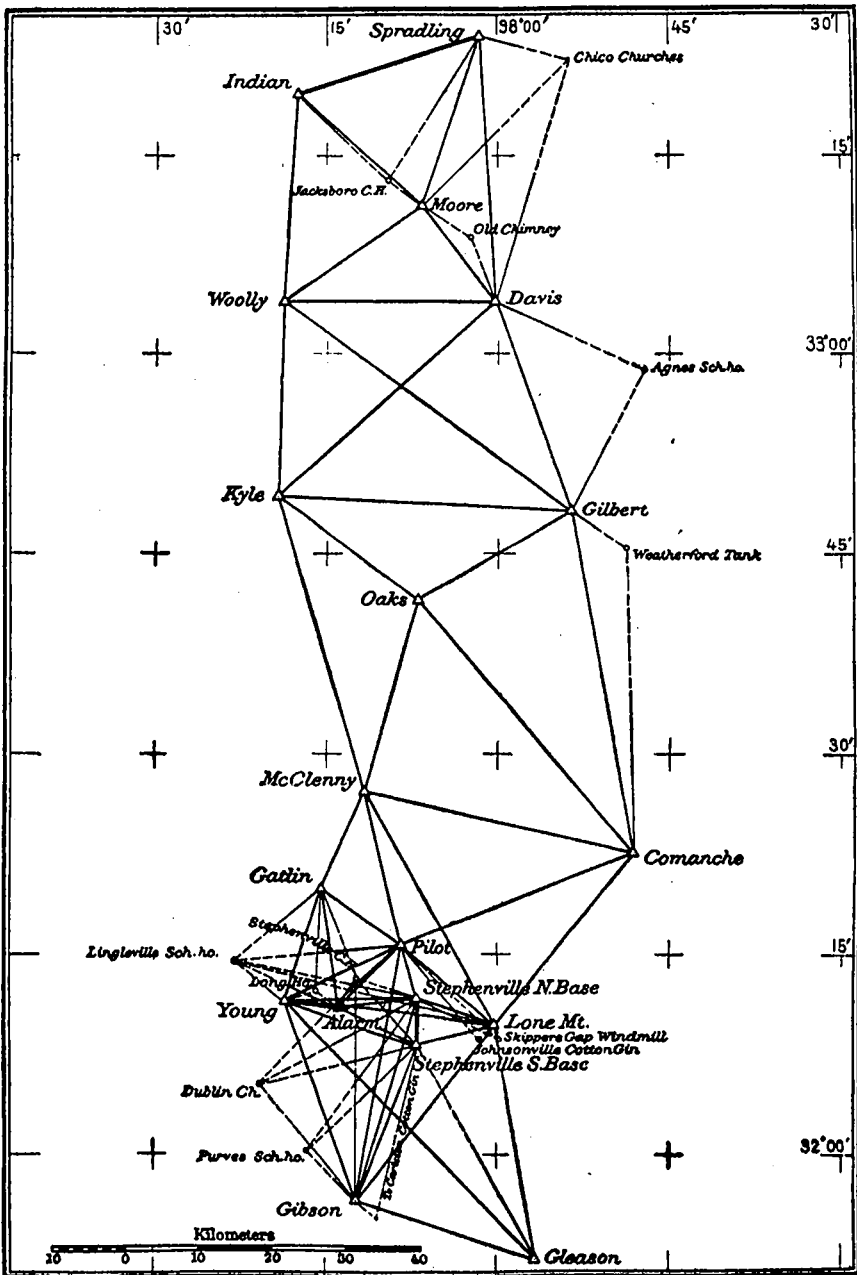


FIG. 7.—Precise triangulation, Bowie to Stephenville, Tex.

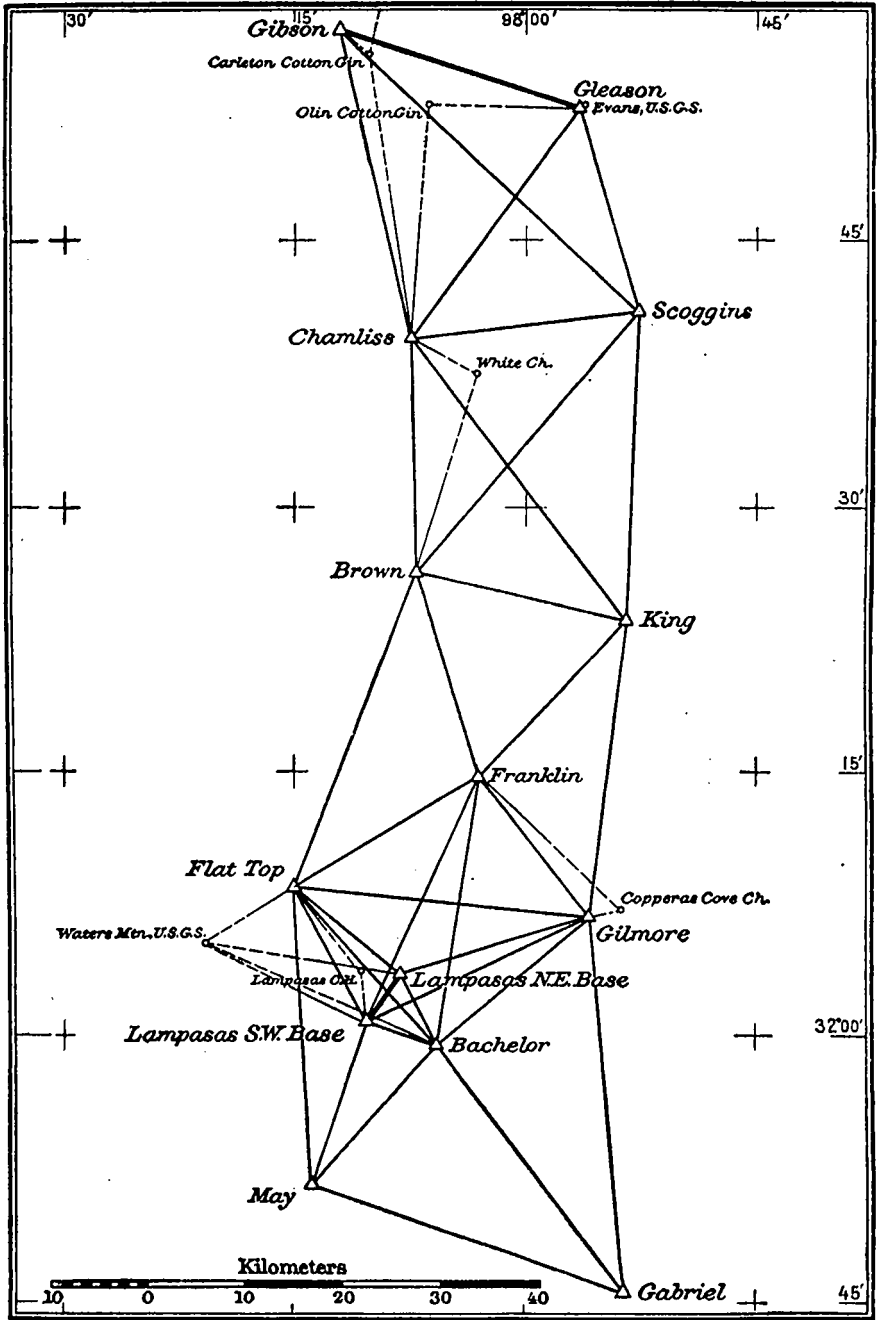


FIG. 8.—Precise triangulation, Stephenville to Lampasas, Tex.

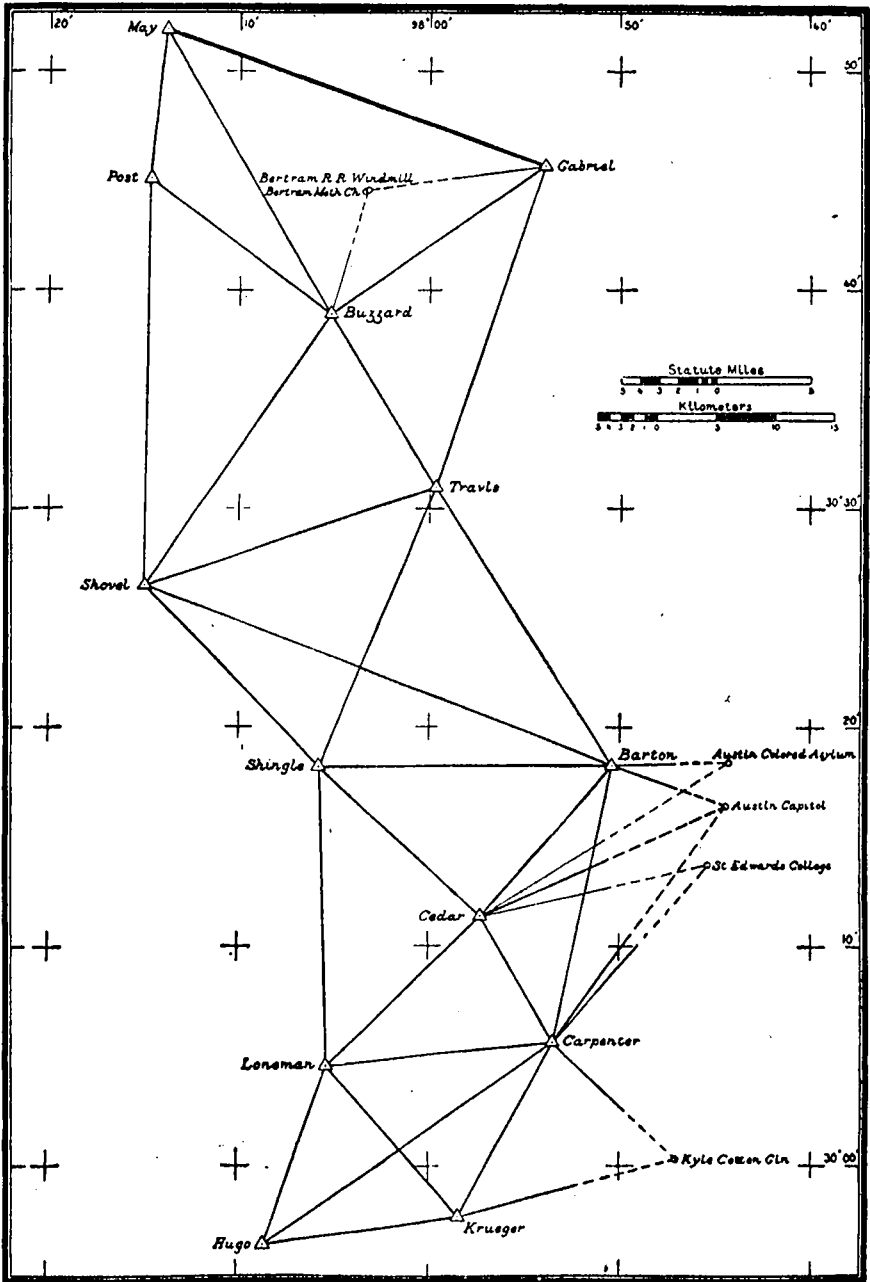


FIG. 9.—Precise triangulation, Lampasas to Austin, Tex.

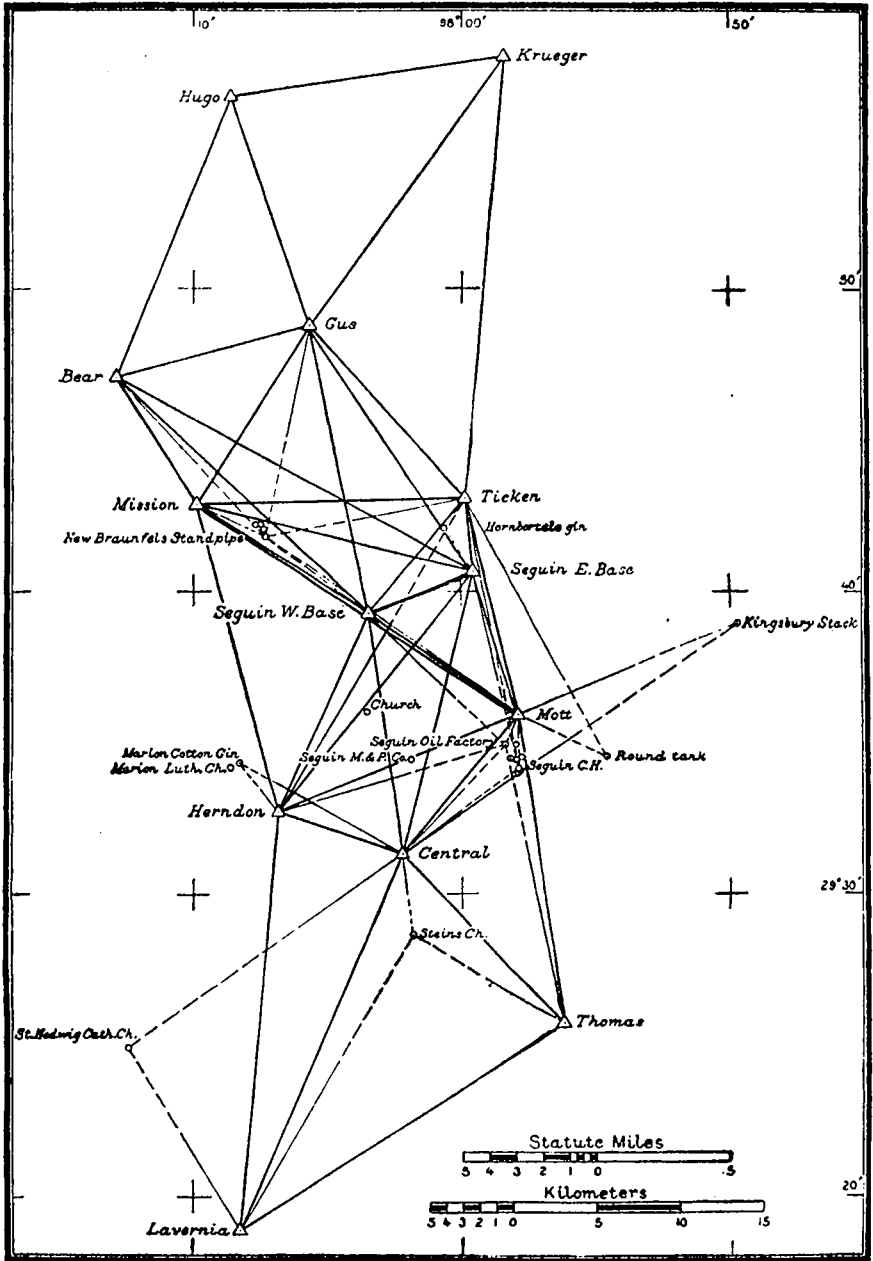


FIG. 10.—Precise triangulation, Austin to Seguin, Tex.

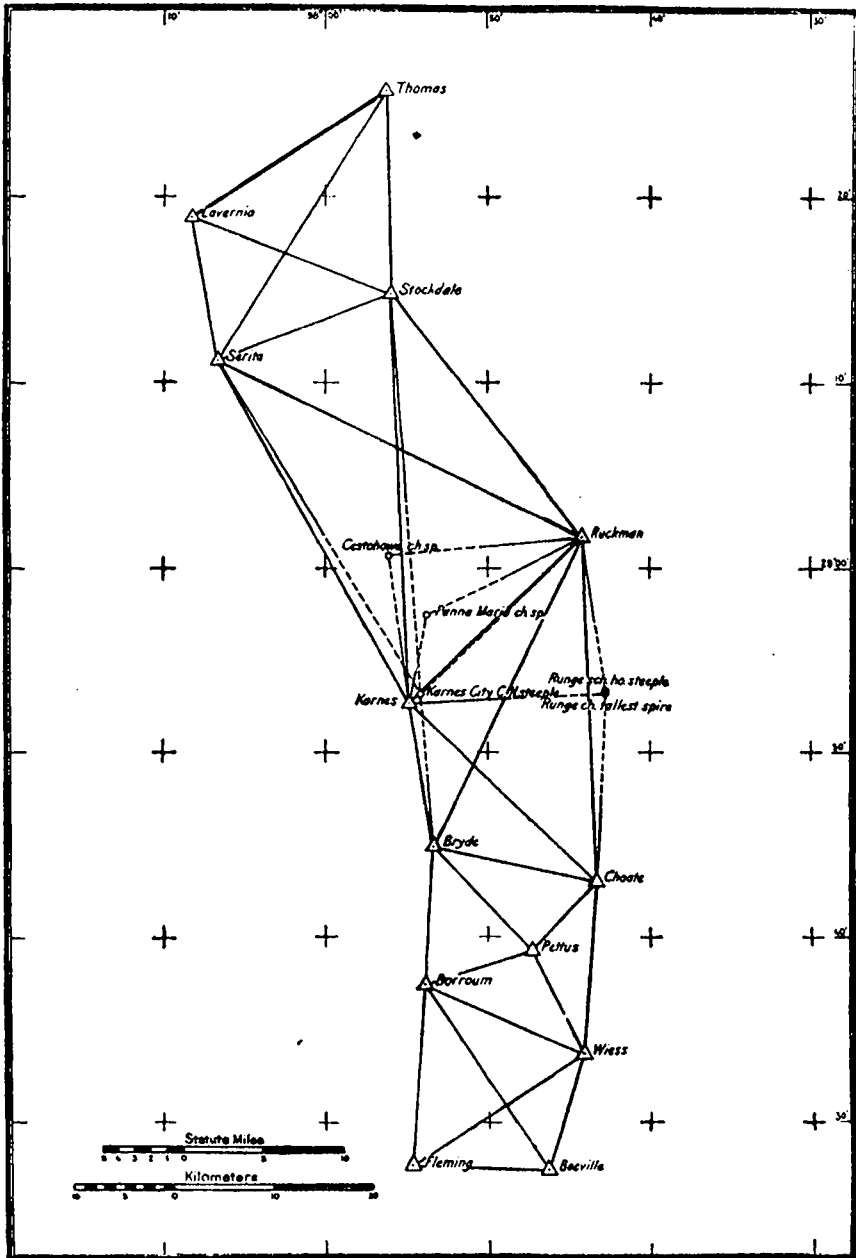


FIG. 11.—Precise triangulation, Seguin to Beeville, Tex.

103781°—22—6

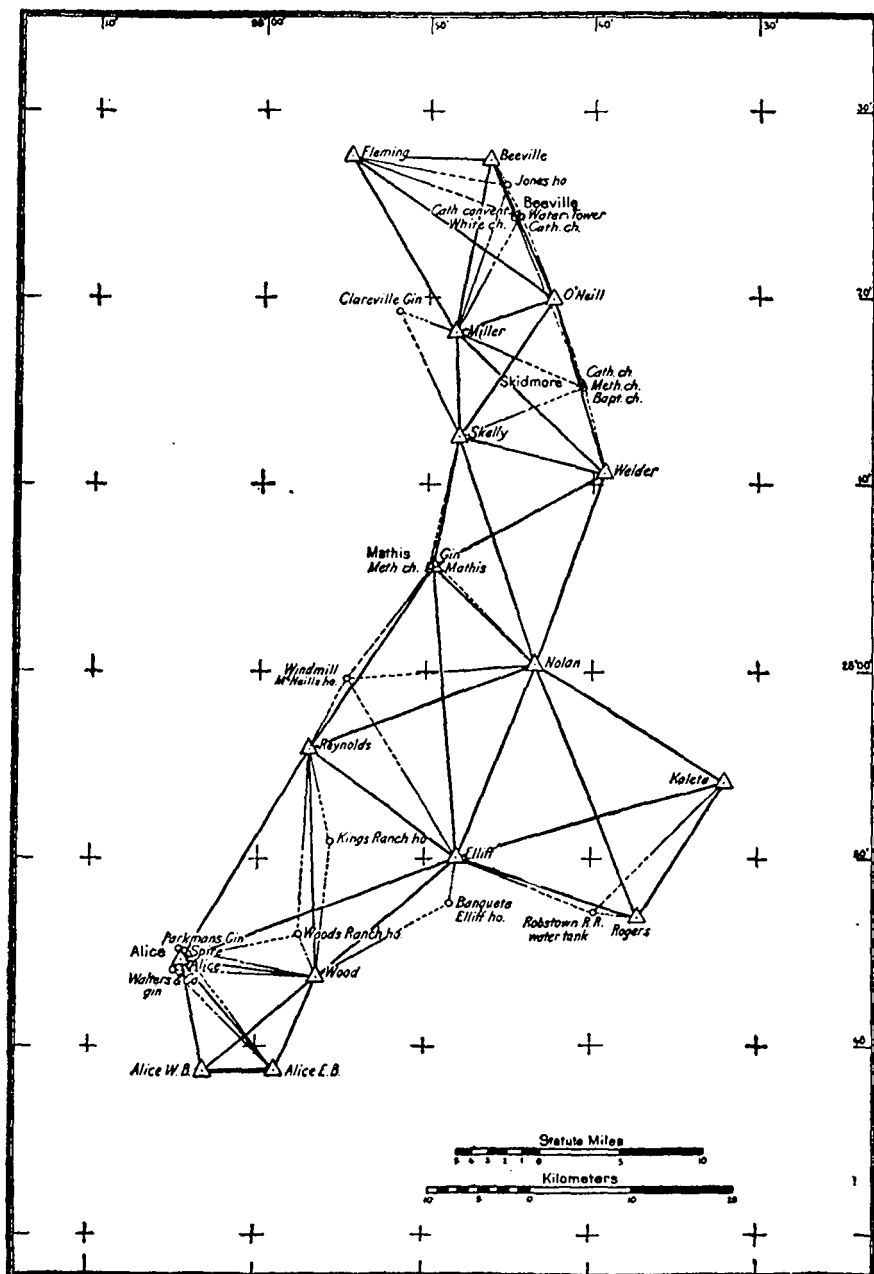


FIG. 12.—Precise triangulation, Bepville to Alice, Tex.

INDEX TO POSITIONS, DESCRIPTIONS, ELEVATIONS, AND FIGURES.

Station.	Position.	Description.	Elevation.	Figure.	Station.	Position.	Description.	Elevation.	Figure.
Agnos:	Page.	Page.	Page.	No.	Bowdecker's windmill tower	Page.	Page.	Page.	No.
Highest windmill	26		38			25		38	6
Schoolhouse, cupola	26		38	7	Bowie:				
Alarm	17	49	36	7	Methodist Church, spire	26		38	
Alice	33	62	30	12	National Hotel, cupola	26		38	
Alice:					Northwest base	15	46	36	6
East base	33	62	39	12	Southeast base	15	46	36	6
Spire	34		39	12	Standpipe (U. S. G. S.)	16		38	6
Walters & Co.'s gin stack	24		39	12	Breckenridge:				
West base	33	62	39	12	Elevator, east gable	20		37	
Antioch church, center spire	19		37	4	Methodist Church, spire	20		37	4
Arbuckle or Velma (U. S. G. S.)	15	44	36	6	Brown	17	49	36	8
Arbuckle Mountain or Mounds (U. S. G. S.)	15	44	36	6	Bryde	22	59	29	11
Austin:					Burson	14	42	36	4, 5
Capitol, dome, star in hand of Liberty	30		38	9	Buzzard	28	53	38	9
Colored Asylum, dome at south end	30		38	9	Caddo	14	43	36	5
Colored Asylum, stand-pipe	30		38	9	Caddo reference mark	22	52		
Latitude station	30	57			Caddo schoolhouse, water tank, center	22		37	5
Longitude station	30	57			Camchester schoolhouse, belfry	18		37	4
North meridian	30	57			Causdian Milling Co.'s elevator, Elreno, east gable	22		37	
University of Texas, main tower	30				Capitol, Austin, dome, star in hand of Liberty	30		38	9
Auxiliary, first	18		37	4	Captain Jones's house	35		39	12
Auxiliary, Sand Hill	18			4	Carleton cotton gin, stack	28		38	8
Auxiliary, second	18			4	Carpenter	20	54	38	9
Bachelor	17	50	36	8	Carson	14	43	36	5
Banquete, Cyrus Elliff's house chimney	84		39	12	Carson reference mark	23	52		5
Baptist Church:					Catholic Church:				
Duncan, spire	24			6	Beaville, spire	35		39	12
Lampasas, first, spire	28		38		Elreno, spire	22		37	5
Marlow, spire	24		37	6	Enid, spire	20		37	4
Nocona, cupola	25		37	6	New Braunfels, spire	31		38	
Skidmore, spire	34		39	12	Okarche, spire	21		37	5
Barton	29	54	38	9	Seguin, spire	32		39	
Bear	20	50	38	10	Skidmore, spire	34		39	12
Beaville	33	60	39	11, 12	Union, spire	23		37	
Beaville:					Catholic Convent, Beaville	35			12
Catholic Church, spire	35		39	12	Cedar	29	54	38	9
Catholic Convent	35			12	Cedar Hill (U. S. G. S.)	30	57		
Water tower	35		39	12	Center section 25, T. 23, R. 4 W., post	20	52		4
White church, red cone, spire	35			12	Central	30	57	38	10
Bellovue:					Costohowa Church, spire	34		39	11
Methodist Church, east gable	25		38	6	Chambliss	17	49	36	8
Orton's windmill	25		38	6	Chico Church, with open spire	26		38	7
Webb's house, cupola	25		38	6	Chico Church, with square top spire	26		38	7
Benton	15	45	36	6	Chimney, old, northwest of Joplin	26		38	7
Bertram:					Choate	32	59	39	11
Methodist Church, spire	30		38	9	Christian Church, Renfrow, center spire	19		37	4
Railroad windmill	30		38	9	Church, red spire	31		39	10
Bison:					Clareville gin stack	35		39	12
Highest elevator, center shaft	21		37	4	Comanche	16	47	36	7
Lower elevator, center	21		37	4	Copperas Cove:				
Blue	15	45	36	6	Church, spire	28		38	8
Borroum	33	59	39	11	Schoolhouse, cupola	28		38	
Boundary mark, Indian Territory and Oklahoma	23	52		5	Cotton compress building, Seguin, top	32		39	
Boundary mile 45	24	52	37	6	Courthouse:				
Boundary stone 160	18	51	37	4	Honolulu, dome	25		37	6
Boundary stone 163	18	51	37	4	Jacksboro, statue	29		38	7
					Karnes City, steeple	34		39	11
					Kingfisher, dome	21		37	5

Station.	Position.	Description.	Elevation.	Figure.	Station.	Position.	Description.	Elevation.	Figure.
Courthouse—Continued.	Page.	Page.	Page.	No.		Page.	Page.	Page.	No.
Lampass, dome.	28		38	8	Gabriel.	18	51	36	8, 9
New Braunfels, tower.	31		39		Garber.	14	42	36	4
Seguin, spire.	31		39	10	Garber:				
Stephenville, tower, center.	27		38	7	Church, white spire.	20		37	4
Cropper east elevator, north gable.	20		37	4	Elevator, center shaft.	20		37	
Cube.	15	45	36	6	Gatlin.	16	48	36	7
Darlington water tank, center.	22		37	5	Gibson.	17	49	36	7, 8
Davis.	16	47	36	7	Gilbert.	16	47	36	7
Dublin:					Gilmore.	17	50	36	8
Church, tall spire.	27		38	7	Gin stack:				
High school, cupola.	27		38		Alice, Walters & Co.	34		39	12
Oil mill, center.	27		38		Clareville.	35		39	12
Standpipe.	27		38		Mathis.	34		39	12
Duncan.	15	45	36	6	Parkman's.	34		39	12
Duncan Baptist Church, spire.	24			6	Gleason.	17	40	36	7, 8
East base:					Grady.	15	45	36	6
Alice.	33	62	39	12	Gus.	29	55	38	10
Elreno.	14	43	36	5	Guthrie:				
Seguin.	29	56	38	10	St. Joseph Church, east spire.	21		37	5
Edmonds.	14	42	36	5	Standpipe.	21		37	
Edmonds College, dome.	21		37	5	Hahn.	14	41	36	4
Eichoff.	14	42	36	5	Honnessey:				
Elevator:					Elevator, center square top.	21		37	4
Big Four, Enid, east gable.	20		37		Roller Mill, stack.	21		37	
Breckenridge, east gable.	20		37		Schoolhouse, dome.	21		37	
Elreno, Canadian Milling Co.'s east gable.	22		37		Windmill at railroad.	21		37	
Garber, center shaft.	20		37		Henrietta:				
Hennessy, center, square top.	21		37	4	Courthouse, dome.	25		37	6
Numa, center shaft.	19		37	4	Schoolhouse, spire.	25		37	
Okarche, center, top.	21		37		Standpipe.	25		37	
Union, rd, center, top.	23		37		Herndon.	29	57	38	10
Ellif.	33	61	39	12	Herndon Hill (U.S.G.S.)	32	57		
Ellif's, Cyrus, house chimney, Banquete.	34		39	12	High elevator:				
Elmota Bond Cpllege, Minco, belfry.	23		37		Renfrow, east gable.	19		37	
Elreno:					Waikita, east gable.	19		37	
Catholic Church, spire.	22		37	5	High school, Dublin, cupola.	27		38	
East base.	14	43	36	5	Highest elevator, Bison, center shaft.	21		37	4
Elevator, Canadian Milling Co.'s, east gable.	22		37		Hornbortel's (August) gin stack.	31		38	10
Fire department, belfry.	22		37		House:				
Kerfoot hotel, cupola.	22		37		5 miles southeast of Henrietta, southeast gable.	25		37	6
Standpipe.	22		37		East of station Grady, north gable.	25		38	6
West base.	15	43	36	5	On ridge, north chimney.	25		38	6
Enid.	14	41	36	4	With square roof, chimney.	23		37	5
Enid:					Young's, J. B.	26		37	6
Big Four elevator, east gable.	20		37		Hugo.	29	55	38	9, 10
Catholic Church, spire.	20		37	4	Hunter elevator, center.	20			4
Ice plant, stack.	20		37						
Schoolhouse, cupola.	20		37		Ice plant, Enid, stack.	20		37	
Evans (?) (U. S. G. S.).	28	53		8	Indian.	16	46	36	6, 7
Fire department, Elreno, belfry.	22		37		Jacksboro:				
First auxiliary.	18		37	4	Courthouse, statue.	26		38	7
Flat Top.	17	50	36	8	Jail, cupola.	26		38	
Fleming.	33	59	39	11, 12	Jim Ned (U. S. G. S.).	16	46		6
Fort Reno:					Johnsonville cotton gin, stack.	27		38	7
Flagpole.	22		37	5	Jones.	15	46	36	6
High water tank, center.	22		37		Jones's, Capt., house, tall-est cone.	35		39	12
Low water tank.	22		37						
Fowler.	14	41	36	4	Kaletn.	33	63	39	12
Franklin.	17	50	36	8	Karnes.	32	58	39	11
Friends College Church, spire.	20			4	Karnes City courthouse, steeple.	34		39	11
					Kechl.	16	44	36	5
					Kerfoot Hotel, Elreno, cupola.	22		37	
					King.	17	50	36	8

Station.	Position.	Description.	Elevation.	Figure.	Station.	Position.	Description.	Elevation.	Figure.
Pond Creek:	<i>Page.</i>	<i>Page.</i>	<i>Page.</i>	<i>No.</i>	Schoolhouse—Contd.	<i>Page.</i>	<i>Page.</i>	<i>Page.</i>	<i>No.</i>
Astronomic station...	19	53			Purves, cupola.....	27		38	7
Roller mill, east cupola.	19		37		Runge, steeple.....	34			11
Schoolhouse, dome.....	19		37		Seguin, short tower				
Standpipe.....	19		37	4	with two collars.	31		39	
Post.....	28	53	38	9	Waukomis, belfry.....	21		37	4
Purcell.....	16	43	30	5	Schultz and Dreyer's				
Purves cotton gin, stack.	28		38		cotton gin, Marion.	31		39	10
Purves schoolhouse, cupola	27			7	Scogins.....	17	49	36	8
Quarter section corner:					Second auxiliary	18			4
Sections 5 and 8, T. 9					Section 2, northeast corner,				
N., R. 7 W.....	23	52	37	5	T. 4 S., R. 7 W.....	24	52		6
Sections 7 and 8, T. 6					Section 3, southeast corner,				
N., R. 2 W.....	23	52		5	T. 2 N., R. 3 E.....	24	52		6
Sections 9 and 16.....	24	52		6	Section 3, southwest corner,				
Sections 23 and 24.....	21	52		4	T. 24 N., R. 4 W.,				
Sections 25 and 26, stone.	18	51	37	4	stone.....	20	51		4
Queen	15	46	36	6	Section 9, southeast corner,				
Railroad windmill, Be- tram	30		38	9	T. 11 N., R. 7 W.....	22	52		5
Ranch house:					Section 13, northwest corner,				
King's, tallest chimney.	34		39	12	T. 29, R. 7 W.....	18	51	37	4
Wood's cupola.....	34		39	12	Section 14, southeast corner,				
Red barn, near section 13, south gable.	18		37	4	T. 28 N., R. 5 W.....	19	51		4
Reference mark:					Section 17, southeast corner				
Caddo.....	22	52			T. 14 N., R. 6 W.....	21	52		5
Carson.....	23	52		5	Section 21, southeast corner				
Sand Hill.....	19	51	37	4	T. 1 S., R. 1 W.....	24	52		6
Renfrow.....	14	41	36	4	Section 24, southwest corner				
Renfrow:					T. 5 S., R. 7 W.....	24	52		
Christian Church, center, spire.	10		37	4	Section 25, southwest corner				
High elevator, east gable.	10		37		T. 1 S., R. 5 W.....	24	52		
Low elevator, east gable.	19		37		Section 29, southwest corner				
Reynolds.....	33	61	39	12	T. 17 N., R. 7 W.....	21	52	37	5
Ringgold Presbyterian Church, spire.	25		37	6	Section center, section 25.	20	52		4
Robstown railway water tank.	34		39	12	Section corner near station				
Rogers.....	33	63	39	12	Grady.....	25	53		6
Roller mill, Hennessey, stack.	21		37		Seguin:				
Round tank, light colored, east of Seguin.	31		39	10	Catholic Church, spire.	32		39	
Ruckman.....	32	58	39	11	Cotton compress building, top.	32		39	
Runce:					Courthouse, spire.....	31		39	10
Church, tallest spire.	35		39	11	East base.....	29	56	38	10
Schoolhouse, steeple.	34				Milling & Power Co.'s tank.	32		39	10
Rutherford.....	14	40	36	4	Oil factory, water tower.	31		39	10
St. Edwards College, chapel, spire.	30			9	Schoolhouse, short tower with two collars.	31		39	
St. Hedwig Catholic Church.	32		39	10	Spire.....	32			
Sand Hill.....	14	41	36	4	Standpipe.....	32		39	
Sand Hill auxiliary.	18			4	West base.....	29	55	38	10
Sand Hill reference mark.	19	51	37	4	Zanke's gin, brick chimney.	32		39	
Schoolhouse:					Serita.....	32	58	39	11
Agnes, cupola.....	26		38	7	Shingle.....	29	54	38	9
Caddo, water tank, center.	22		37	5	Shingle Hill (U. S. G. S.).	30	57		
Camchester, belfry.....	18		37	4	Shovel.....	29	53	38	9
Copperas Cove, cupola.	28		38		Shovel Mountain (U. S. G. S.)	30	57		
Enid, cupola.....	20		37		Skelly.....	33	60	39	12
Hennessey, dome.....	21		37		Skidmore:				
Henrietta, spire.....	25		37		Baptist Church, spire.	34		39	12
Kremlin, belfry.....	20		37		Catholic Church, spire.	34		39	12
Lampasas, cupola.....	28		38		Methodist Church, spire.	34		39	12
Lingleville, cupola.....	26		38	7	Skippers Gap windmill.	27			7
Manchester, belfry.....	18		37	4	Smith.....	14	43	39	5
Medford, cupola.....	19		37	4	South base, Stephenville.	17	49	39	7
Midland, belfry.....	22		37	5	Southeast base, Bowie.	15	46	39	6
Nocona, cupola.....	25		37		Southwest base, Lampasas.	17	51	39	8
Pond Creek, dome.....	19		37		Spire:				
					Alice.....	34		39	12
					New Braunfels.....	31		38	
					Seguin.....	32			
					Spradling.....	16	46	39	6, 7
					Springhouse, Lampasas, cupola.	28		38	

INDEX TO POSITIONS, DESCRIPTIONS, ELEVATIONS, AND FIGURES. 87

Station.	Position.	Description.	Elevation.	Figure.	Station.	Position.	Description.	Elevation.	Figure.
Standpipe:	<i>Page.</i>	<i>Page.</i>	<i>Page.</i>	<i>No.</i>	Wakita—Continued.	<i>Page.</i>	<i>Page.</i>	<i>Page.</i>	<i>No.</i>
Bowie (U. S. G. S.)	16		38	6	Low elevator, east gable	19		37	
Dublin	27		38		Walters & Co's, gin stack, Alice	34		39	12
Elrono	22		37		Water tower, Beeville	35		39	12
Guthrie	21		37		Waters Mountain (U. S. G. S.)	28		38	8
Henrietta	25		37		Waukomis	14	42	36	4
Kingfisher	31		37		Waukomis schoolhouse, belfry	21		37	4
New Braunfels	21		39	10	Weatherford:				
Norman	23				Tank, near white house	26		38	7
Pond Creek	19		37	4	White house, with red roof, cupola	26		38	
Seguin	32		39		Yellow house, with dark roof, cupola	26		38	
Steins Church, spire	32		39	10	Webb's house, Bellevue, cupola	25		38	6
Stephenville:					Welder	33	60	39	12
Courthouse, tower, center	27		38	7	West base:				
North base	16	48	30	7	Alice	33	62	39	12
Oil mill, stack	27		38		Elrono	15	43	36	5
South base	17	49	36	7	Seguin	29	55	38	10
Tarleton College, dome center	27		38		White church southeast of Chamliiss	28		38	8
Stockdale	32	58	39	11	White house, Weatherford, with red roof, cupola	26		38	
Table Hill	15	44	36	5, 6	Wless	33	59	39	11
Tank, Weatherford	26		38	7	Windmill:				
Tarleton College, Stephenville, dome center	27		38		Hennessey, at railroad	21		37	
Thomas	30	58	38	10, 11	McNall's, P. E.	34		39	12
Tleken	29	55	38	10	Wingard	14	42	36	4, 5
Township corner, Ts. 3 and 4 S., Rs. 3 and 4 W.	24	52		0	Wood	33	62	39	12
Township corner, Ts. 25 and 26, Rs. 6 and 7 W., cedar post	20	51		4	Wood's ranch house, cupola	34		39	12
Travis	29	53	38	9	Wooly	16	47	36	7
Union:					Yellow house, Weatherford, with dark roof, cupola	26		38	
Catholic Church, spire	23		37	5	Young	16	48	36	7
Methodist Church, spire	23			5	Young's, J. B., house, north chimney	26			6
Red elevator, center top	23		37		Yukon	14	43	38	5
University of Texas, Austin, main tower	30				Zanke's gin, Seguin, brick chimney	32		39	
Velma (U. S. G. S.) or Arbuckle	15	44	36	6					
Vicar	14	41	38	4					
Wakita:									
Church, white spire	19		37	4					
High elevator, east gable	19		37						