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TABLES FOR ALBERS PROJECTION

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PREFACE

The Board of Surveys and Maps of the Federal Government has adopted the Albers projection for the general map of the United States. Since no table of coordinates for such a map had been computed, it was decided by this bureau to make such a computation. At the request of the United States Geological Survey, a table on the same projection was computed to serve for the Philippine Islands, the Hawaiian Islands, the Canal Zone, and Porto Rico, and another separate table for Alaska. All of these tables are included in this publication. In order that the nature of the projection may be better understood, a full mathematical discussion of the derivation is also included. In this way the publication is rendered quite complete in itself, both for theory and for practical map construction.

TABLES FOR ALBERS PROJECTION

By Oscar S. Adams, *Mathematician United States Coast and Geodetic Survey*

CONTENTS

GENERAL DESCRIPTION

The Albers projection belongs in the class of conical projections in which the parallels are represented by a system of concentric circles and the meridians by the radii of these same circles. Such projections can be extended any distance in an east and west direction without suffering any additional scale distortion. Because of this property they are well suited for general maps of the United States. The Albers projection belongs, also, in the equal-area class, and maps constructed with this basis are well suited for comparison of area. Since the scale along two parallels is held exact, it is possible to keep the scale variation in the extent of the United States within limits that are practically negligible in the resulting map. The Albers projection thus gives an equal-area representation that is as good as any other and in many respects superior to all others.

MATHEMATICAL THEORY OF THE ALBERS PROJECTION

If a is the equatorial radius of the spheroid, ϵ the eccentricity, and ϕ the latitude, the radius of curvature of the meridian [1] is given in the form

$$\rho_m = \frac{a\,(1-\epsilon^2)}{(1 - \epsilon^2 \sin^2 \phi)^{3/2}},$$

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[1] See U. S. Coast and Geodetic Survey Special Publication No. 57, pp. 9-10.

and the radius of curvature perpendicular to the meridian is equal to

$$\rho_n = \frac{a}{(1 - \epsilon^2 \sin^2 \phi)^{1/2}}.$$

The differential element of length of the meridian is therefore equal to the expression

$$dm = \frac{a \ (1 - \epsilon^2) \ d\phi}{(1 - \epsilon^2 \sin^2 \phi)^{3/2}},$$

and that of the parallel becomes

$$dp = \frac{a \cos \phi \ d\lambda}{(1 - \epsilon^2 \sin^2 \phi)^{1/2}},$$

in which λ is the longitude.

The element of area upon the spheroid is thus expressed in the form

$$dS = dm \ dp = \frac{a^2 \ (1 - \epsilon^2) \ \cos \phi \ d\phi d\lambda}{(1 - \epsilon^2 \sin^2 \phi)^2}.$$

We wish now to determine an equal-area projection of the spheroid in the plane.

If ρ is the radius vector in the plane and θ is the angle which this radius vector makes with some initial line, the element of area in the plane is given by the form

$$dS' = \rho \ d\rho \ d\theta.$$

ρ and θ must be expressed as functions of ϕ and λ, and therefore

$$d\rho = \frac{\partial \rho}{\partial \phi} d\phi + \frac{\partial \rho}{\partial \lambda} d\lambda$$

and

$$d\theta = \frac{\partial \theta}{\partial \phi} d\phi + \frac{\partial \theta}{\partial \lambda} d\lambda.$$

We will now introduce the condition that the parallel shall be represented by concentric circles; ρ will therefore be a function of ϕ alone,
or

$$d\rho = \frac{\partial \rho}{\partial \phi} d\phi.$$

As a second condition, we require that the meridians be represented by straight lines, the radii of the system of concentric circles. This requires that θ should be independent of ϕ,
or

$$d\theta = \frac{\partial \theta}{\partial \lambda} d\lambda.$$

Furthermore, if θ and λ are to vanish at the same time and if equal differences of longitude are to be represented at all points by equal arcs on the parallels, θ must be equal to some constant times λ, or

$$\theta = n\lambda,$$

in which n is the required constant.

This gives us

$$d\theta = n\,d\lambda.$$

By substituting these values in the expression for dS' we get

$$dS' = \rho\frac{\partial\rho}{\partial\phi}n\,d\phi\,d\lambda.$$

Since the projection is to be equal-area, dS' must equal $-dS$, or

$$\rho\frac{\partial\rho}{\partial\phi}n\,d\phi\,d\lambda = -\frac{a^2(1-\epsilon^2)\,\cos\phi\,d\phi\,d\lambda}{(1-\epsilon^2\sin^2\phi)^2}.$$

The minus sign is explained by the fact that ρ decreases as ϕ increases.

By omitting the $d\lambda$ we find that ρ is determined by the integral

$$\int_0^\phi \rho\frac{\partial\rho}{\partial\phi}d\phi = -\frac{a^2(1-\epsilon^2)}{n}\int_0^\phi \frac{\cos\phi\,d\phi}{(1-\epsilon^2\sin^2\phi)^2}.$$

If R represents the radius for $\phi = 0$, this becomes

$$\rho^2 - R^2 = -\frac{2a^2(1-\epsilon^2)}{n}\int_0^\phi \frac{\cos\phi\,d\phi}{(1-\epsilon^2\sin^2\phi)^2}.$$

If β is the latitude on a sphere of radius c, the right-hand member would be represented by the integral

$$u = -\frac{2c^2}{n}\int_0^\beta \cos\beta\,d\beta = -\frac{2c^2}{n}\sin\beta.$$

We may define β by setting this quantity equal to the above right-hand member, or

$$c^2\sin\beta = a^2(1-\epsilon^2)\int_0^\phi \frac{\cos\phi\,d\phi}{(1-\epsilon^2\sin^2\phi)^2}$$

$$= a^2(1-\epsilon^2)\int_0^\phi (\cos\phi + 2\epsilon^2\sin^2\phi\cos\phi + 3\epsilon^4\sin^4\phi\cos\phi$$

$$+ 4\epsilon^6\sin^6\phi\cos\phi + \ldots\ldots)d\phi.$$

Therefore,

$$c^2 \sin \beta = a^2(1 - \epsilon^2)\left(\sin \phi + \frac{2\epsilon^2}{3} \sin^3 \phi + \frac{3\epsilon^4}{5} \sin^5 \phi + \frac{4\epsilon^6}{7} \sin^7 \phi + \ldots \ldots \right) \cdot$$

As yet c is an undetermined constant. We may determine it by introducing the condition that,

when $\phi = \frac{\pi}{2}$, β shall also equal $\frac{\pi}{2}$.

This gives

$$c^2 = a^2(1 - \epsilon^2)\left(1 + \frac{2\epsilon^2}{3} + \frac{3\epsilon^4}{5} + \frac{4\epsilon^6}{7} + \cdot \cdot \cdot \cdot \cdot \right) \cdot$$

The latitude on the sphere is thus defined in the form

$$\sin \beta = \sin \phi \left(\frac{1 + \frac{2\epsilon^2}{3} \sin^2 \phi + \frac{3\epsilon^4}{5} \sin^4 \phi + \frac{4\epsilon^6}{7} \sin^6 \phi + \cdot \cdot \cdot \cdot \cdot \cdot}{1 + \frac{2\epsilon^2}{3} + \frac{3\epsilon^4}{5} + \frac{4\epsilon^6}{7} + \cdot \cdot \cdot \cdot \cdot \cdot} \right)$$

This latitude on the sphere has been called the authalic latitude, the term authalic meaning equivalent or equal-area. A table of these latitudes for every half degree of geodetic latitude is given in United States Coast and Geodetic Survey Special Publication No. 67.

With this latitude the expression for ρ becomes

$$\rho^2 = R^2 - \frac{2c^2}{n} \sin \beta.$$

The two constants n and R are as yet undetermined.

Let us introduce the condition that the scale shall be exact along two given parallels. On the spheroid the length of the parallel for a given longitude difference λ is equal to the expression

$$P = \frac{a\lambda \cos \phi}{(1 - \epsilon^2 \sin^2 \phi)^{1/2}}.$$

On the map this arc is represented by

$$\rho\theta = \rho n\lambda.$$

On the two parallels along which the scale is to be exact, if we denote them by subscripts, we have

$$\rho_1 n\lambda = \frac{a\lambda \cos \phi_1}{(1 - \epsilon^2 \sin^2 \phi_1)^{1/2}},$$

or, on omitting λ, we have

$$\rho_1 = \frac{a \cos \phi_1}{n(1 - \epsilon^2 \sin^2 \phi_1)^{1/2}},$$

and

$$\rho_2 = \frac{a \cos \phi_2}{n(1 - \epsilon^2 \sin^2 \phi_2)^{1/2}}.$$

Substituting these values in turn in the general equation for ρ, we get

$$R^2 - \frac{2c^2}{n} \sin \beta_1 = \frac{a^2 \cos^2 \phi_1}{n^2 (1 - \epsilon^2 \sin^2 \phi_1)}$$

and

$$R^2 - \frac{2c^2}{n} \sin \beta_2 = \frac{a^2 \cos^2 \phi_2}{n^2 (1 - \epsilon^2 \sin^2 \phi_2)}.$$

In United States Coast and Geodetic Survey Special Publication No. 8 a quantity called A' is defined as

$$A' = \frac{(1 - \epsilon^2 \sin^2 \phi')^{\frac{1}{2}}}{a \sin 1''};$$

and is there tabulated for every minute of latitude.
Hence

$$\frac{a^2}{(1 - \epsilon^2 \sin^2 \phi_1)} = \frac{1}{A_1^2 \sin^2 1''}.$$

(The prime on A is here omitted for convenience)

The equations for determining R and n, therefore, become

$$R^2 - \frac{2c^2}{n} \sin \beta_1 = \frac{\cos^2 \phi_1}{A_1^2 n^2 \sin^2 1''}$$

and

$$R^2 - \frac{2c^2}{n} \sin \beta_2 = \frac{\cos^2 \phi_2}{A_2^2 n^2 \sin^2 1''}.$$

By subtracting these equations and reducing we get

$$n = \frac{\dfrac{\cos^2 \phi_1}{A_1^2 \sin^2 1''} - \dfrac{\cos^2 \phi_2}{A_2^2 \sin^2 1''}}{2c^2 (\sin \beta_2 - \sin \beta_1)}$$

$$= \frac{\dfrac{\cos^2 \phi_1}{A_1^2 \sin^2 1''} - \dfrac{\cos^2 \phi_2}{A_2^2 \sin^2 1''}}{4c^2 \sin \tfrac{1}{2} (\beta_2 - \beta_1) \cos \tfrac{1}{2} (\beta_2 + \beta_1)} = \frac{r_1^2 - r_2^2}{4c^2 \sin \tfrac{1}{2} (\beta_2 - \beta_1) \cos \tfrac{1}{2} (\beta_2 + \beta_1)},$$

r_1 and r_2 being the radii of the respective parallels upon the spheroid.

By substituting the value of n in the above equations we could determine R, but we are only interested in canceling this quantity from the general equation for ρ.

Since n is determined, we have for the determination of ρ_1

$$\rho_1 = \frac{a \cos \phi_1}{n (1 - \epsilon^2 \sin^2 \phi_1)^{\frac{1}{2}}} = \frac{\cos \phi_1}{n A_1 \sin 1''} = \frac{r_1}{n}.$$

But

$$\rho_1^2 = R^2 - \frac{2c^2}{n} \sin \beta_1.$$

By subtracting this equation from the general equation for the determination of ρ we get

$$\rho^2 - \rho_1{}^2 = \frac{2c^2}{n} \ (\sin \beta_1 - \sin \beta)$$

or

$$\rho^2 = \rho_1{}^2 + \frac{4c^2}{n} \ \sin \tfrac{1}{2} \ (\beta_1 - \beta) \cos \tfrac{1}{2} \ (\beta_1 + \beta).$$

In a similar manner we have

$$\rho_2 = \frac{a \cos \phi_2}{n(1 - \epsilon^2 \sin^2 \phi_2)^{\frac{1}{2}}} = \frac{\cos \phi_2}{nA_2 \sin 1''} = \frac{r_2}{n}$$

and

$$\rho^2 = \rho_2{}^2 + \frac{4c^2}{n} \ \sin \tfrac{1}{2} \ (\beta_2 - \beta) \cos \tfrac{1}{2} \ (\beta_2 + \beta).$$

The radius c is the radius of a sphere having a surface equivalent to that of the spheroid. For the Clarke spheroid of 1866 (c in meters)

$$\log c = 6.80420742$$

For the authalic latitudes use the table in United States Coast and Geodetic Survey Special Publication No. 67.

Now, if λ is reckoned as longitude out from the central meridian, which becomes the y axis, we get

$$\theta = n\lambda,$$
$$x = \rho \sin \theta,$$
$$y = -\rho \cos \theta.$$

In this case the origin is the center of the system of concentric circles, the central meridian is the y axis, and a line perpendicular to this central meridian through the origin is the x axis. The y coordinate is negative because it is measured downward.

If it is desired to refer the coordinates to the center of the map as a single system of coordinates, the values become

$$x = \rho \sin \theta,$$
$$y = \rho_0 - \rho \cos \theta,$$

in which ρ_0 is the radius of the parallel passing through the center of the map.

The coordinates of points on each parallel may be referred to a separate origin, the point in which the parallel intersects the central meridian. In this case the coordinates become

$$x = \rho \sin \theta,$$
$$y = \rho - \rho \cos \theta = 2\rho \sin^2 \tfrac{1}{2} \ \theta.$$

If the map to be constructed is of such a scale that the parallels can be constructed by the use of a beam compass, it is more expeditious to proceed in the following manner:

If λ' is the λ of the meridian farthest out from the central meridian on the map, we get

$$\theta' = n\lambda'.$$

We then determine the chord on the circle representing the lowest parallel of the map, from its intersection with the central meridian to its intersection with the meridian represented by λ',

$$\text{chord} = 2\rho \sin \tfrac{1}{2} \theta'.$$

With this value set off on the beam compass and with the intersection of the parallel with the central meridian as center, strike an arc intersecting the parallel at the point where the meridian of λ' intersects it. The arc on the parallel represents λ' degrees of longitude, and it can be divided proportionately for the other intersections.

Proceed in the same manner for the upper parallel of the map. Then straight lines drawn through corresponding points on these two parallels will determine all of the meridians.

The scale along the parallels, k_p, is given by the expression

$$k_p = \frac{n\rho_s}{r_s},$$

in which ρ_s is the radius of the circle representing the parallel of ϕ_s and r_s is the radius of the same parallel on the spheroid; hence

$$r_s = \frac{\cos \phi_s}{A'_s \sin 1''}.$$

The scale along the meridians is equal to the reciprocal of the expression for the scale along the parallels, or

$$k_m = \frac{r_s}{n\rho_s}.$$

CONSTRUCTION OF THE PROJECTION

If the map to be constructed is not on too large a scale the graticule can be drawn by the use of a scale, straightedge, and beam compass. In a map of the United States the central or ninety-sixth meridian can be extended far enough to include the common center of the circles of latitude, and these circles can be drawn in with the beam compass set to the respective values of the radii taken from the table of radii, taking into account the scale of the map.

To determine the meridians, a chord of 20° of longitude taken from the table may be laid off from the central meridian both east and west on one of the parallels near the bottom of the map. If the arcs thus determined are divided into 20 equal parts and straight lines are drawn joining these points with the common center of the parallel circles, these straight lines will represent the meridians. The meridians beyond 20° on each side may be determined by laying off the degree arcs beyond the 20° and then joining these points of division in a similar way with the center of the circles.

If a long straightedge is not available, the spacings of the meridians on a parallel near the top of the map may be determined by the

use of the chord, just as was done with the parallel at the bottom of the map. Straight lines joining corresponding points on the upper and lower parallels will then determine the meridians of the map.

This method of construction is less laborious than that by the use of coordinates, though the length of a beam compass required for the construction of a map of the United States on a scale larger than 1 : 5,000,000 practically renders it impossible to use this method with the required accuracy. For such maps the table of coordinates makes it possible to plot the parallels by the coordinate method.

For maps of the Philippine Islands the radii are so long that it would be practically impossible to use the beam compass for a map of any ordinary scale. The map maker is almost compelled to resort to the table of coordinates. Such tables have been computed for all the three regions covered in this publication, so that the map maker can choose the method of construction that seems most convenient.

CONSTRUCTION AND USE OF THE TABLES

The tables of coordinates are computed with the central meridian as axis of y and a tangent to one of the lower parallels as the axis of x. In the tables for Alaska and the Philippine Islands this parallel is the lowest one for which coordinates are computed, but in the table for the United States the parallel of 23° is chosen, although some coordinates are computed for both the parallels of 21° and 22°. However, all of the coordinates listed are positive, so there need be no confusion in regard to sign. The argument in longitude is in degrees out from the central meridian. Only the coordinates to the eastward are given. The section to the westward is exactly similar to that to the eastward. That is, when an x value is plotted it should at the same time be laid off to the right and to the left of the central meridian. Then the y value will be the same for both points.

When a projection is being plotted by coordinates it is more economical to proceed in the following way: Plot a parallel near the upper limit and another near the lower limit of the region to be represented. Then the straight lines joining corresponding points on these two parallels will represent the meridians. Next, divide up each meridian between these parallels in the same way that the central meridian is divided by the spacings of the parallels on it. These values may be taken from the y values for longitude 0°, or the successive divisions may be taken from the table of spacings of the parallels. This, in a very convenient way, will determine all of the points on the various parallels and will involve much less labor than would be required to plot the various points by coordinates. Any points required on parallels outside of the limits of the upper and lower parallels that were plotted by coordinates may be found in a similar way by laying off on the meridians the corresponding values from the tables of spacings of the parallels.

The table for the Philippine Islands has been so adapted that the same table can be used for the Hawaiian Islands, the Canal Zone, Porto Rico, and Guam. It is only necessary to use the coordinates for the respective latitudes and count the longitudes from the central meridian of the region to be mapped.

The coordinates for all three projections have been tabulated for the intersection of every degree of latitude with every degree of longitude. If it should be desired to make a map on a large scale

for some special region or for a single State in the United States, it might be desirable to have more meridians and parallels represented upon the map. In such a case the following method may be employed: On the upper and lower parallels the degree arcs can be divided into the required number of equal parts. If every 10 minutes of longitude is to be shown, each degree must be divided into 6 equal parts on each of the 2 parallels; then the straight-line meridians can be drawn on the projection. It then becomes necessary to divide these meridians between the various parallels. This can be done within a few units in the last place by interpolation with the use of second differences. To illustrate the method, we have the following example: Suppose we want to determine the 10' parallels between 40° and 41°. From the table of parallel spacings on page 12 we can form the following table of differences:

Spacings	First difference	Second difference
40° to 41° (112011)__		
	−90	
41° to 42° (111921)__		−44
	−134	
42° to 43° (111787)__		

$$40° \text{ to } 40° \ 10' = \frac{1}{6}(112011) + \frac{\frac{1}{6}\left(\frac{1}{6}-1\right)}{2}(-90) + \frac{\frac{1}{6}\left(\frac{1}{6}-1\right)\left(\frac{1}{6}-2\right)}{2 \cdot 3}(-44)$$

$$= \frac{1}{6}(112011) + \frac{5}{72}(90) - \frac{55}{1296}(44)$$

$$= 18673$$

$$40° \text{ to } 40° \ 20' = \frac{2}{6}(112011) + \frac{\frac{2}{6}\left(\frac{2}{6}-1\right)}{2}(-90) + \frac{\frac{2}{6}\left(\frac{2}{6}-1\right)\left(\frac{2}{6}-2\right)}{2 \cdot 3}(-44)$$

$$= \frac{1}{3}(112011) + \frac{1}{9}(90) - \frac{5}{81}(44)$$

$$= 37344$$

$$40° \text{ to } 40° \ 30' = \frac{1}{2}(112011) + \frac{1}{8}(90) - \frac{1}{16}(44)$$

$$= 56015$$

$$40° \text{ to } 40° \ 40' = \frac{2}{3}(112011) + \frac{1}{9}(90) - \frac{4}{81}(44)$$

$$= 74682$$

$$40° \text{ to } 40° \ 50' = \frac{5}{6}(112011) + \frac{5}{72}(90) - \frac{35}{1296}(44)$$

$$= 93348$$

If these values are used to divide the meridians between the parallels of 40° and 41°, we obtain the points on the various 10' parallels, and these parallels can then be drawn in on the projection. This illustrates the method of procedure in any given case. Since an uncertainty of 5 units in the last place would mean only one-half of a millimeter on a scale of 1:10,000, any uncertainty in the above divisions would be negligible, since probably no such map would be constructed on a larger scale than 1:50,000 or 1:100,000.

In this kind of equal-area projections in which the parallels and meridians intersect at right angles the scale factor along the meridian at any point is the reciprocal of the scale factor along the parallel. It results, then, that one scale factor is greater than unity and the other less than unity; or, in other words, that the scale is too short in one direction and too long in the other. In turning in azimuth around any given point there must, of necessity, be some direction in which the scale is correct or the scale factor equal to unity. It is also evident that there are two such directions of azimuth and that they are equally inclined to the meridian both to the right and to the left. The angle that these lines make with the meridian is such that its tangent is equal to the scale factor along the parallel. On the map of the United States at 40° of latitude we have

$$\tan \alpha = 0.9910$$

$$\alpha = 44° \ 44', \text{ approximately.}$$

This angle, laid off to the right and left of any meridian at any point on this parallel, gives the direction of these isoperimetric curves at the latitude of 40° and at the longitude of the given meridian. In an approximate way, a curve that cuts the meridian at about an angle of 45° is close to correct in scale. If the projection were extended much farther in latitude, this curve would depart more and more from the angle of 45°, but within the limits of the projection, as computed, it does not depart as much as 1° from 45°, as can easily be verified from the table of scale factors given on page 12.

INTERPOLATION OF COORDINATES FOR A MAP OF EXCEPTIONALLY LARGE SCALE

If a map is to be constructed on a scale as great as 1:100,000 the coordinates of the even degree intersections would not be sufficient for the construction of the parallels at the top and bottom of the map. In such a case it would be necessary to determine coordinates of the intermediate points before the required parallels could be drawn on the map. An example will illustrate how such coordinates can be determined. The interpolation of the x values is made in a way similar to the procedure in interpolating the spacings of the parallels on the meridian. To make the matter perfectly clear, we shall interpolate the coordinates for the first degree on the fortieth parallel, so as to determine the 10' intersections.

Interpolation of x values for fortieth parallel

	Values from table	First difference	Second difference
0°	0		
		+84623	
1°	84623		−9
		+84614	
2°	169237		

$$0° \text{ to } 0° \ 10' = 1/6 \ (84623) + \ 5/72(9) = 14104.\ 5$$
$$0° \text{ to } 0° \ 20' = 1/3 \ (84623) + \ 1/9 \ (9) = 28208.\ 7$$
$$0° \text{ to } 0° \ 30' = 1/2 \ (84623) + \ 1/8 \ (9) = 42312.\ 6$$
$$0° \text{ to } 0° \ 40' = 2/3 \ (84623) + \ 1/9 \ (9) = 54616.\ 3$$
$$0° \text{ to } 0° \ 50' = 5/6 \ (84623) + \ 5/72(9) = 70519.\ 8$$

Interpolation of the y values for fortieth parallel

	Values from table	First difference
0°	1886917	
		445
1°	1887362	

$$0°10' = 1886917 + \ \ 1/36 \ (445) = 1886929.\ 4$$
$$0°20' = 1886917 + \ \ 4/36 \ (445) = 1886966.\ 4$$
$$0°30' = 1886917 + \ \ 9/36 \ (445) = 1887028.\ 2$$
$$0°40' = 1886917 + 16/36 \ (445) = 1887114.\ 8$$
$$0°50' = 1886917 + 25/36 \ (445) = 1887226.\ 0$$

Since the first difference of the y values varies approximately as the square of the arc distance from the central meridian, we find the y values for the 10′ intersections by dividing the first difference by the square of 6, or 36, and then multiplying this quotient successively by the square of one, two, etc.

If it is required to interpolate farther than 1° from the central meridian, it is best to proceed as follows: After the meridian of 1° has been drawn on the projection this meridian can be taken as a new y axis and a new x axis drawn perpendicular to this meridian where the fortieth parallel intersects it. On these new axes the same values of x and y can be used to plot the second degree as were used for the first degree. In the same manner any number of degrees could be plotted from the interpolation of the single degree. By this method the table could be used for the construction of a map of any scale that might be desired.

Albers projection tables for the United States: Computation of elements

Latitude (degrees)	ρ	log ρ	Scale factor		Chords along parallels			
			Along parallel	Along meridian	1°	5°	10°	20°
	Meters				*Meters*	*Meters*	*Meters*	*Meters*
52	6, 713, 780	6. 8269671	1. 0286	0. 9722	70, 647	353, 193	706, 142	1, 410, 329
51	6, 822, 264	6. 8339285	1. 0226	. 9779	71, 788	358, 900	717, 552	1, 433, 118
50	6, 931, 333	6. 8408167	1. 0172	. 9830	72, 936	364, 638	729, 023	1, 456, 029
49	7, 040, 925	6. 8476297	1. 0125	. 9876	74, 089	370, 403	740, 550	1, 479, 051
48	7, 150, 987	6. 8543600	1. 0083	. 9918	75, 247	376, 193	752, 126	1, 502, 171
47	7, 261, 459	6. 8610239	1. 0046	. 9954	76, 410	382, 005	763, 745	1, 525, 377
46	7, 372, 288	6. 8676023	1. 0014	. 9986	77, 576	387, 835	775, 402	1, 548, 658
45½	7, 427, 822	6. 8708615	1. 0000	1. 0000	--------	--------	--------	--------
45	7, 483, 426	6. 8741005	. 9987	1. 0013	78, 745	393, 682	787, 091	1, 572, 004
44	7, 594, 828	6. 8805179	. 9964	1. 0036	79, 918	399, 542	798, 808	1, 595, 406
43	7, 706, 444	6. 8868540	. 9945	1. 0056	81, 092	405, 414	810, 548	1, 618, 853
42	7, 818, 231	6. 8931085	. 9929	1. 0071	82, 268	411, 295	822, 305	1, 642, 335
41	7, 930, 152	6. 8992815	. 9918	1. 0083	83, 446	417, 183	834, 077	1, 665, 846
40	8, 042, 163	6. 9053729	. 9910	1. 0091	84, 625	423, 076	845, 858	1, 689, 375
39	8, 154, 228	6. 9113829	. 9905	1. 0096	85, 804	428, 971	857, 645	1, 712, 916
38	8, 266, 312	6. 9173118	. 9903	1. 0098	86, 983	434, 867	869, 434	1, 736, 461
37	8, 378, 377	6. 9231599	. 9904	1. 0097	88, 163	440, 763	881, 220	1, 760, 002
36	8, 490, 392	6. 9289278	. 9909	1. 0092	89, 341	446, 656	893, 002	1, 783, 533
35	8, 602, 328	6. 9346160	. 9916	1. 0085	90, 519	452, 544	904, 775	1, 807, 046
34	8, 714, 150	6. 9402250	. 9925	1. 0075	91, 696	458, 427	916, 536	1, 830, 536
33	8, 825, 827	6. 9457554	. 9937	1. 0063	92, 871	464, 302	928, 282	1, 853, 996
32	8, 937, 337	6. 9512081	. 9952	1. 0048	94, 044	470, 168	940, 011	1, 877, 420
31	9, 048, 648	6. 9565827	. 9970	1. 0031	95, 216	476, 024	951, 718	1, 900, 803
30	9, 159, 738	6. 9618830	. 9989	1. 0011	96, 385	481, 868	963, 402	1, 924, 139
29½	9, 215, 188	6. 9645042	1. 0000	1. 0000	--------	--------	975, 060	1, 947, 422
29	9, 270, 576	6. 9671067	1. 0011	. 9989	97, 551	487, 599	975, 060	1, 947, 422
28	9, 381, 139	6. 9722556	1. 0036	. 9964	98, 714	493, 515	986, 689	1, 970, 647
27	9, 491, 409	6. 9773307	1. 0062	. 9938	99, 875	499, 316	998, 287	1, 993, 811
26	9, 601, 361	6. 9823328	1. 0091	. 9910	101, 032	505, 101	1, 009, 851	2, 016, 908
25	9, 710, 969	6. 9872626	1. 0122	. 9879	102, 185	510, 867	1, 021, 380	2, 039, 933
24	9, 820, 218	6. 9921243	1. 0155	. 9847	103, 335	516, 614	1, 032, 870	2, 062, 882
23	9, 929, 080	6. 9969189	1. 0191	. 9813	104, 480	522, 341	1, 044, 320	2, 085, 750
22	10, 037, 540	7. 0016273	1. 0228	. 9777	105, 621	528, 047	1, 055, 728	2, 108, 534
21	10, 145, 579	7. 0062769	1. 0268	. 9739	106, 758	533, 730	1, 067, 001	2, 131, 229
20	10, 253, 177	7. 0108585	1. 0310	. 9700	107, 890	539, 391	1, 078, 408	2, 153, 832

Albers projection tables for the United States: Spacings of parallels

Latitude (degrees)	Spacing of parallels on meridians	Latitude (degrees)	Spacing of parallels on meridians	Latitude (degrees)	Spacing of parallels on meridians
	Meters		*Meters*		*Meters*
51–52	108, 484				
50–51	109, 069				
49–50	109, 592	39–40	112, 065	29–30	110, 838
48–49	110, 062	38–39	112, 084	28–29	110, 563
47–48	110, 472	37–38	112, 065	27–28	110, 270
46–47	110, 829	36–37	112, 015	26–27	109, 952
45–46	111, 138	35–36	111, 936	25–26	109, 608
44–45	111, 402	34–35	111, 822	24–25	109, 249
43–44	111, 616	33–34	111, 677	23–24	108, 862
42–43	111, 787	32–33	111, 510	22–23	108, 460
41–42	111, 921	31–32	111, 311	21–22	108, 039
40–41	112, 011	30–31	111, 090	20–21	107, 598

Albers projection tables for the United States: Angles between meridians and central meridian

[Colog $n = 0.2197522$]

Longitude from central meridian λ	$n\lambda$			Longitude from central meridian λ	$n\lambda$			Longitude from central meridian λ	$n\lambda$			Longitude from central meridian λ	$n\lambda$		
°	°	′	″	°	°	′	″	°	°	′	″	°	°	′	″
1	0	36	10.45	11	6	37	54.98	21	12	39	39.50	31	18	41	24.03
2	1	12	20.90	12	7	14	05.43	22	13	15	49.96	32	19	17	34.48
3	1	48	31.36	13	7	50	15.88	23	13	52	00.41	33	19	53	44.93
4	2	24	41.81	14	8	26	26.34	24	14	28	10.86				
5	3	00	52.26	15	9	02	36.79	25	15	04	21.31				
6	3	37	02.72	16	9	38	47.24	26	15	40	31.76				
7	4	13	13.17	17	10	14	57.69	27	16	16	42.22				
8	4	49	23.62	18	10	51	08.14	28	16	52	52.07				
9	5	25	34.07	19	11	27	18.60	29	17	29	03.12				
10	6	01	44.52	20	12	03	29.05	30	18	05	13.58				

Albers projection tables for the United States: Coordinates

Latitude (degrees)	Longitude from central meridian							
	0°		1°		2°		3°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
52	0	3,215,300	70,645	3,215,672	141,283	3,216,787	211,905	3,218,645
51	0	3,106,816	71,787	3,107,194	143,566	3,108,327	215,329	3,110,215
50	0	2,997,747	72,935	2,998,131	145,861	2,999,282	218,772	3,001,200
49	0	2,888,155	74,088	2,888,545	148,167	2,889,714	222,231	2,891,663
48	0	2,778,093	75,246	2,778,489	150,483	2,779,677	225,705	2,781,656
47	0	2,667,621	76,408	2,668,023	152,808	2,669,229	229,191	2,671,239
46	0	2,556,792	77,574	2,557,200	155,140	2,558,425	232,689	2,560,465
45	0	2,445,654	78,744	2,446,068	157,479	2,447,311	236,197	2,449,382
44	0	2,334,252	79,916	2,334,672	159,823	2,335,934	239,713	2,338,036
43	0	2,222,636	81,091	2,223,063	162,172	2,224,343	243,236	2,226,476
42	0	2,110,849	82,267	2,111,282	164,525	2,112,580	246,705	2,114,744
41	0	1,998,928	83,445	1,999,367	166,880	2,000,684	250,297	2,002,879
40	0	1,886,917	84,623	1,887,362	169,237	1,888,698	253,833	1,890,924
39	0	1,774,852	85,802	1,775,303	171,595	1,776,658	257,370	1,778,915
38	0	1,662,768	86,982	1,663,226	173,954	1,664,599	260,908	1,666,886
37	0	1,550,703	88,161	1,551,167	176,312	1,552,558	264,444	1,554,877
36	0	1,438,688	89,340	1,439,158	178,669	1,440,568	267,980	1,442,918
35	0	1,326,752	90,518	1,327,228	181,025	1,328,657	271,513	1,331,038
34	0	1,214,930	91,694	1,215,412	183,378	1,216,860	275,042	1,219,272
33	0	1,103,253	92,869	1,103,742	185,728	1,105,207	278,567	1,107,650
32	0	991,743	94,043	992,238	188,075	993,722	282,087	996,196
31	0	880,432	95,214	880,933	190,417	882,436	285,600	884,940
30	0	769,342	96,383	769,849	192,755	771,370	289,106	773,906
29	0	658,504	97,549	659,017	195,087	660,557	292,605	663,123
28	0	547,941	98,713	548,460	197,414	550,018	296,094	552,615
27	0	437,671	99,873	438,196	199,735	439,773	299,575	442,400
26	0	327,719	101,030	328,251	202,048	329,845	303,045	332,503
25	0	218,111	102,183	218,649	204,355	220,261	306,505	222,049
24	0	108,862	103,333	109,406	206,654	111,037	309,953	113,755
23	0	0	104,478	550	208,945	2,199	313,389	4,947

Latitude (degrees)	Longitude from central meridian							
	4°		5°		6°		7°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
52	282,504	3,221,246	353,071	3,224,500	423,599	3,228,677	494,080	3,233,505
51	287,068	3,112,858	358,770	3,116,256	430,444	3,120,409	502,064	3,125,315
50	291,658	3,003,886	364,512	3,007,338	437,325	3,011,557	510,091	3,016,542
49	296,269	2,894,391	370,275	2,897,898	444,240	2,902,183	518,156	2,907,247
48	300,900	2,784,426	376,063	2,787,988	451,184	2,792,341	526,255	2,797,483
47	305,549	2,674,052	381,873	2,677,669	458,154	2,682,089	534,385	2,687,311
46	310,212	2,563,321	387,701	2,566,993	465,147	2,571,481	542,541	2,576,782
45	314,889	2,452,282	393,546	2,456,009	472,159	2,460,564	550,720	2,465,946
44	319,577	2,340,979	399,404	2,344,761	479,188	2,349,384	558,918	2,354,846
43	324,273	2,229,461	405,274	2,233,300	486,230	2,237,990	567,132	2,243,533
42	328,977	2,117,773	411,153	2,121,668	493,283	2,126,420	575,359	2,132,049
41	333,686	2,005,952	417,039	2,009,901	500,345	2,014,728	583,596	2,020,431
40	338,400	1,894,040	422,920	1,898,045	507,412	1,902,940	591,839	1,908,724
39	343,115	1,782,074	428,822	1,786,135	514,483	1,791,099	600,086	1,796,963
38	347,831	1,670,089	434,717	1,674,207	521,555	1,679,238	608,334	1,685,181
37	352,547	1,558,124	440,610	1,562,297	528,625	1,567,396	616,581	1,573,421
36	357,260	1,446,208	446,501	1,450,437	535,693	1,455,604	624,825	1,461,710
35	361,970	1,334,371	452,388	1,338,656	542,755	1,343,891	633,062	1,350,078
34	366,676	1,222,648	458,268	1,226,988	549,810	1,232,292	641,292	1,238,559
33	371,376	1,111,070	464,141	1,115,466	556,857	1,120,838	649,510	1,127,185
32	376,007	999,659	470,005	1,004,110	563,892	1,009,550	657,716	1,015,977
31	380,751	888,446	475,859	892,953	570,915	898,461	665,908	904,968
30	385,425	777,455	481,701	782,017	577,924	787,592	674,083	794,179
29	390,089	666,715	487,530	671,332	584,918	676,975	682,240	683,642
28	394,741	556,250	493,344	560,922	591,803	566,632	690,377	573,379
27	399,381	446,077	499,143	450,805	598,851	456,582	698,492	463,408
26	404,008	336,223	504,920	341,005	605,788	346,849	706,583	353,754
25	408,620	226,712	510,690	231,549	612,704	237,459	714,649	244,443
24	413,217	117,560	516,435	122,451	619,597	128,428	722,689	135,490
23	417,793	8,794	522,160	13,739	626,465	19,783	730,701	26,923

Albers projection tables for the United States: Coordinates—Continued

Latitude (degrees)	Longitude from central meridian							
	8°		9°		10°		11°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
51	573,628	3,130,975	645,129	3,137,387	716,559	3,144,551	787,909	3,152,467
50	582,799	3,022,292	655,443	3,028,807	728,015	3,036,086	800,506	3,044,128
49	592,014	2,913,088	665,806	2,919,706	739,525	2,927,100	813,162	2,935,269
48	601,268	2,803,416	676,214	2,810,137	751,085	2,817,647	825,868	2,825,944
47	610,557	2,693,335	686,661	2,700,160	762,688	2,707,786	838,032	2,716,211
46	619,875	2,582,898	697,141	2,589,828	774,329	2,597,570	851,432	2,606,124
45	629,220	2,472,154	707,650	2,479,188	786,002	2,487,046	864,267	2,495,729
44	638,587	2,361,146	718,185	2,368,285	797,703	2,376,261	877,133	2,385,073
43	647,972	2,249,926	728,739	2,257,169	809,426	2,265,262	890,024	2,274,204
42	657,371	2,138,534	739,310	2,145,883	821,168	2,154,093	902,934	2,163,165
41	666,782	2,027,010	749,894	2,034,464	832,923	2,042,791	915,860	2,051,993
40	676,200	1,915,395	760,486	1,922,954	844,688	1,931,400	928,796	1,940,731
39	685,622	1,803,727	771,083	1,811,392	856,458	1,819,955	941,739	1,829,416
38	695,047	1,692,040	781,682	1,699,810	868,231	1,708,491	954,683	1,718,082
37	704,469	1,580,372	792,279	1,588,247	880,001	1,597,045	967,626	1,606,767
36	713,888	1,468,754	802,871	1,476,734	891,766	1,485,650	980,563	1,495,501
35	723,299	1,357,214	813,456	1,365,300	903,523	1,374,333	993,490	1,384,314
34	732,702	1,245,788	824,030	1,253,979	915,268	1,263,130	1,006,405	1,273,241
33	742,092	1,134,507	834,591	1,142,802	926,998	1,152,070	1,019,302	1,162,311
32	751,468	1,023,391	845,136	1,031,792	938,710	1,041,177	1,032,181	1,051,547
31	760,827	912,475	855,661	920,980	950,401	930,482	1,045,036	940,981
30	770,167	801,778	866,166	810,387	962,069	820,006	1,057,866	830,634
29	779,487	691,332	876,647	700,046	973,711	709,781	1,070,667	720,538
28	788,783	581,161	887,103	589,978	985,324	599,830	1,083,436	610,715
27	798,051	471,281	897,530	480,203	996,905	490,170	1,096,171	501,183
26	807,300	361,719	907,927	370,743	1,008,454	380,826	1,108,869	391,966
25	816,516	252,499	918,292	261,626	1,019,966	271,824	1,121,528	283,092
24	825,702	143,037	928,623	152,867	1,031,441	163,180	1,134,145	174,574
23	834,855	35,160	938,917	44,493	1,042,875	54,920	1,146,718	66,440

Latitude (degrees)	Longitude from central meridian							
	12°		13°		14°		15°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
51	859,172	3,161,133	930,337	3,170,548	1,001,405	3,180,712	1,072,359	3,191,623
50	872,908	3,052,932	945,210	3,062,498	1,017,415	3,072,824	1,089,503	3,083,909
49	886,709	2,944,213	960,155	2,953,930	1,033,501	2,964,419	1,106,729	2,975,680
48	900,570	2,835,027	975,104	2,844,896	1,049,656	2,855,540	1,124,029	2,866,986
47	914,483	2,725,435	990,220	2,735,456	1,065,872	2,746,274	1,141,394	2,757,887
46	928,440	2,615,488	1,005,342	2,625,662	1,082,140	2,636,645	1,158,814	2,648,436
45	942,436	2,505,235	1,020,498	2,515,563	1,098,453	2,526,711	1,176,284	2,538,679
44	956,460	2,394,720	1,035,690	2,405,201	1,114,806	2,416,516	1,193,794	2,428,662
43	970,523	2,283,992	1,050,910	2,294,628	1,131,189	2,306,109	1,211,339	2,318,434
42	984,601	2,173,095	1,066,154	2,183,885	1,147,598	2,195,533	1,228,910	2,208,036
41	998,696	2,062,066	1,081,417	2,073,010	1,164,026	2,084,824	1,246,502	2,097,507
40	1,012,802	1,950,946	1,096,692	1,962,045	1,180,468	1,974,026	1,264,109	1,986,888
39	1,026,915	1,839,774	1,111,974	1,851,027	1,196,917	1,863,175	1,281,724	1,876,216
38	1,041,030	1,728,582	1,127,258	1,739,990	1,213,369	1,752,305	1,299,342	1,765,525
37	1,055,143	1,617,409	1,142,540	1,628,972	1,229,819	1,641,454	1,316,957	1,654,853
36	1,069,250	1,506,286	1,157,816	1,518,003	1,246,201	1,530,652	1,334,564	1,544,231
35	1,083,347	1,395,241	1,173,080	1,407,113	1,262,601	1,419,929	1,352,158	1,433,686
34	1,097,429	1,284,309	1,188,329	1,296,336	1,279,105	1,309,318	1,369,735	1,323,255
33	1,111,494	1,173,522	1,203,558	1,185,702	1,295,498	1,198,850	1,387,289	1,212,966
32	1,125,537	1,062,899	1,218,764	1,075,234	1,311,865	1,088,548	1,404,817	1,102,842
31	1,139,555	952,475	1,233,944	964,002	1,328,264	978,443	1,422,313	992,914
30	1,153,545	842,269	1,249,093	854,910	1,344,511	868,556	1,439,775	883,205
29	1,167,504	732,314	1,264,207	745,108	1,360,780	758,919	1,457,107	773,745
28	1,181,428	622,631	1,279,285	635,578	1,377,009	649,553	1,474,576	664,557
27	1,195,315	513,239	1,294,322	526,338	1,393,195	540,478	1,491,909	555,657
26	1,209,162	404,162	1,309,316	417,413	1,409,334	431,717	1,509,192	447,072
25	1,222,965	295,427	1,324,263	308,829	1,425,423	323,296	1,526,420	338,827
24	1,236,724	187,048	1,339,161	200,600	1,441,459	215,230	1,543,593	230,936
23	1,250,433	79,052	1,354,008	92,755	1,457,438	107,547	1,560,704	123,427
22					1,473,359	266	1,577,753	16,315

Albers projection tables for the United States: Coordinates—Continued

Latitude (degrees)	16° x	16° y	17° x	17° y	18° x	18° y	19° x	19° y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
51	1,143,194	3,203,279	1,213,903	3,215,681				
50	1,161,471	3,095,753	1,233,310	3,108,353	1,305,012	3,121,707	1,376,570	3,135,816
49	1,179,835	2,987,710	1,252,810	3,000,509	1,325,646	3,014,075	1,398,335	3,028,407
48	1,198,278	2,879,204	1,272,393	2,892,204	1,346,368	2,905,982	1,420,194	2,920,538
47	1,216,789	2,770,294	1,292,050	2,783,404	1,367,167	2,797,485	1,442,134	2,812,266
46	1,235,361	2,661,033	1,311,770	2,674,434	1,388,034	2,688,039	1,464,145	2,703,645
45	1,253,984	2,551,466	1,331,545	2,565,069	1,408,958	2,579,488	1,486,217	2,594,721
44	1,272,651	2,441,639	1,351,367	2,455,445	1,429,933	2,470,078	1,508,341	2,485,538
43	1,291,354	2,331,601	1,371,227	2,345,610	1,450,948	2,360,459	1,530,508	2,376,145
42	1,310,086	2,221,395	1,391,118	2,235,607	1,471,995	2,250,671	1,552,709	2,266,585
41	1,328,841	2,111,056	1,411,032	2,125,472	1,493,067	2,140,749	1,574,937	2,156,891
40	1,347,610	2,000,629	1,430,962	2,015,248	1,514,156	2,030,744	1,597,182	2,047,114
39	1,366,389	1,890,149	1,450,902	1,904,972	1,535,255	1,920,683	1,619,439	1,937,281
38	1,385,171	1,779,650	1,470,846	1,794,676	1,556,358	1,810,603	1,641,699	1,827,430
37	1,403,949	1,669,169	1,490,786	1,684,399	1,577,457	1,700,542	1,663,955	1,717,597
36	1,422,719	1,558,738	1,510,717	1,574,172	1,598,547	1,590,531	1,686,201	1,607,813
35	1,441,476	1,448,385	1,530,634	1,464,022	1,619,622	1,480,597	1,708,432	1,498,107
34	1,460,214	1,338,144	1,550,531	1,353,985	1,640,676	1,370,774	1,730,640	1,388,512
33	1,478,927	1,228,046	1,570,402	1,244,090	1,661,702	1,261,095	1,752,819	1,279,060
32	1,497,613	1,118,113	1,590,243	1,134,359	1,682,697	1,151,579	1,774,965	1,169,771
31	1,516,265	1,009,375	1,610,049	1,024,824	1,703,654	1,042,259	1,797,071	1,060,677
30	1,534,880	898,856	1,629,815	915,507	1,724,570	933,155	1,819,134	951,800
29	1,553,453	789,585	1,649,537	806,438	1,745,438	824,300	1,841,147	843,170
28	1,571,980	680,586	1,669,210	697,639	1,766,254	715,714	1,863,105	734,809
27	1,590,458	571,875	1,688,831	589,128	1,787,016	607,416	1,885,004	626,736
26	1,608,882	463,477	1,708,395	480,931	1,807,717	499,430	1,906,841	518,974
25	1,627,249	355,419	1,727,897	373,072	1,828,354	391,783	1,928,609	411,550
24	1,645,556	247,715	1,747,336	265,560	1,848,923	284,487	1,950,306	304,477
23	1,663,797	140,392	1,766,706	158,442	1,869,419	177,872	1,971,926	197,783
22	1,681,972	33,466	1,786,005	51,711	1,889,840	71,048	1,993,466	91,480

Latitude (degrees)	20° x	20° y	21° x	21° y	22° x	22° y	23° x	23° y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
50	1,447,976	3,150,677	1,519,221	3,166,289	1,590,298	3,182,649	1,661,199	3,199,756
49	1,470,870	3,043,503	1,543,242	3,059,362	1,615,443	3,075,981	1,687,465	3,093,358
48	1,493,862	2,935,870	1,567,365	2,951,976	1,640,605	2,968,855	1,713,843	2,986,504
47	1,516,940	2,827,835	1,591,579	2,844,190	1,666,041	2,861,330	1,740,319	2,879,252
46	1,540,093	2,719,451	1,615,870	2,736,056	1,691,469	2,753,457	1,766,881	2,771,653
45	1,563,310	2,610,765	1,640,230	2,627,620	1,716,968	2,645,284	1,793,517	2,663,754
44	1,586,582	2,501,821	1,664,647	2,518,927	1,742,528	2,536,854	1,820,216	2,555,599
43	1,609,899	2,392,668	1,689,111	2,410,025	1,768,137	2,428,215	1,846,966	2,447,236
42	1,633,252	2,283,347	1,713,613	2,300,957	1,793,785	2,319,410	1,873,758	2,338,707
41	1,656,632	2,173,894	1,738,144	2,191,755	1,819,463	2,210,472	1,900,581	2,230,045
40	1,680,032	2,064,356	1,762,695	2,082,470	1,845,163	2,101,452	1,927,427	2,121,301
39	1,703,443	1,954,764	1,787,257	1,973,130	1,870,875	1,992,376	1,954,285	2,012,502
38	1,726,857	1,845,153	1,811,824	1,863,771	1,896,591	1,883,282	1,981,147	1,903,085
37	1,750,268	1,735,560	1,836,387	1,754,431	1,922,302	1,774,207	2,008,005	1,794,886
36	1,773,668	1,626,017	1,860,938	1,645,140	1,948,003	1,665,180	2,034,851	1,686,135
35	1,797,052	1,516,550	1,885,473	1,535,926	1,973,685	1,556,230	2,061,679	1,577,462
34	1,820,412	1,407,196	1,909,982	1,426,823	1,999,341	1,447,391	2,088,478	1,468,899
33	1,843,742	1,297,983	1,934,460	1,317,861	2,024,964	1,338,693	2,115,244	1,360,476
32	1,867,036	1,188,933	1,958,900	1,209,063	2,050,548	1,230,158	2,141,969	1,252,216
31	1,890,290	1,080,078	1,983,298	1,100,458	2,076,087	1,121,816	2,168,646	1,144,149
30	1,913,497	971,439	2,007,647	992,070	2,101,575	1,013,690	2,195,270	1,036,297
29	1,936,651	863,046	2,031,940	883,927	2,127,005	905,808	2,221,834	928,689
28	1,959,748	754,923	2,056,174	776,052	2,152,372	798,195	2,248,332	821,349
27	1,982,784	647,086	2,080,343	668,463	2,177,672	690,806	2,274,760	714,292
26	2,005,753	539,560	2,104,442	561,185	2,202,890	583,848	2,301,112	607,545
25	2,028,650	432,370	2,128,466	454,242	2,228,047	477,103	2,327,381	501,131
24	2,051,473	325,531	2,152,412	347,650	2,253,113	370,829	2,353,564	395,060
23	2,074,214	219,071	2,176,272	241,435	2,278,090	264,871	2,379,655	289,377
22	2,096,872	113,000	2,200,045	135,008	2,302,974	159,300	2,405,649	184,078
21	2,119,442	7,349	2,223,725	30,200	2,327,762	54,147	2,431,542	79,368

Albers projection tables for the United States: Coordinates—Continued

Latitude (degrees)	Longitude from central meridian							
	24°		25°		26°		27°	
	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
50	1,731,917	3,217,609	1,802,441	3,236,205	1,872,767	3,255,539		
49	1,759,300	3,111,493	1,830,940	3,130,383	1,902,377	3,150,023	1,973,605	3,170,418
48	1,786,801	3,004,922	1,859,561	3,024,107	1,932,116	3,044,055	2,004,456	3,064,769
47	1,814,404	2,897,954	1,888,288	2,917,436	1,961,963	2,937,691	2,035,421	2,958,725
46	1,842,097	2,790,641	1,917,108	2,810,420	1,991,908	2,830,984	2,066,487	2,852,339
45	1,869,867	2,683,028	1,946,009	2,703,105	2,021,936	2,723,980	2,097,640	2,745,657
44	1,897,703	2,575,160	1,974,978	2,595,536	2,052,036	2,616,721	2,128,867	2,638,721
43	1,925,592	2,467,084	2,004,003	2,487,760	2,082,193	2,509,257	2,160,153	2,531,579
42	1,953,524	2,358,843	2,033,085	2,379,818	2,112,397	2,401,627	2,191,487	2,424,274
41	1,981,489	2,250,470	2,062,177	2,271,746	2,142,636	2,293,869	2,222,859	2,316,830
40	2,009,477	2,142,014	2,091,304	2,163,590	2,172,901	2,186,024	2,254,257	2,209,319
39	2,037,479	2,033,504	2,120,446	2,055,381	2,203,179	2,078,127	2,285,669	2,101,746
38	2,065,485	1,924,975	2,149,593	1,947,153	2,233,403	1,970,211	2,317,087	1,994,156
37	2,093,486	1,816,465	2,178,734	1,838,943	2,263,742	1,862,314	2,348,499	1,886,583
36	2,121,475	1,708,003	2,207,803	1,730,782	2,294,007	1,754,405	2,379,897	1,779,059
35	2,149,444	1,599,618	2,236,971	1,622,697	2,324,251	1,646,693	2,411,274	1,671,610
34	2,177,385	1,491,343	2,266,049	1,514,722	2,354,464	1,539,029	2,442,618	1,564,271
33	2,205,290	1,383,208	2,295,090	1,406,887	2,384,638	1,431,506	2,473,921	1,457,071
32	2,233,152	1,275,235	2,324,088	1,299,213	2,414,766	1,324,143		
31	2,260,965	1,167,455	2,353,033	1,191,731	2,444,841	1,216,972		
30	2,288,723	1,059,889	2,381,921	1,084,463	2,474,857	1,110,014		
29	2,316,418	952,507	2,410,744	977,438				
28	2,344,044	845,511	2,439,495	870,679				
27	2,371,597	738,740	2,468,170	764,203				
26	2,399,071	632,274						
25	2,426,458	526,143						
24	2,453,756	420,359						
23	2,480,957	314,950						

Latitude (degrees)	Longitude from central meridian							
	28°		29°		30°		31°	
	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
49	2,044,612	3,191,560	2,115,305	3,213,454				
48	2,076,573	3,086,240	2,148,462	3,108,470	2,220,114	3,131,454	2,291,518	3,155,192
47	2,108,653	2,980,529	2,181,653	3,003,102	2,254,411	3,026,441	2,326,918	3,050,545
46	2,140,837	2,874,475	2,214,951	2,897,393	2,288,819	2,921,089	2,362,433	2,945,561
45	2,173,110	2,768,127	2,248,341	2,791,300	2,323,323	2,815,443	2,398,047	2,840,284
44	2,205,460	2,661,525	2,281,811	2,685,134	2,357,909	2,709,546	2,433,746	2,734,756
43	2,237,872	2,554,719	2,315,345	2,578,675	2,392,562	2,603,445	2,469,513	2,629,026
42	2,270,334	2,447,749	2,348,931	2,472,053	2,427,268	2,497,182		
41	2,302,834	2,340,651	2,382,557	2,365,302	2,462,015	2,390,701		
40	2,335,361	2,233,466	2,416,210	2,258,466				
39	2,367,904	2,126,231	2,449,879	2,151,579				
38	2,400,452	2,018,976	2,483,554	2,044,673				
37	2,432,994	1,911,740						
36	2,465,522	1,804,552						

Latitude (degrees)	Longitude from central meridian			
	32°		33°	
	x	y	x	y
	Meters	Meters	Meters	Meters
48	2,357,235	3,179,679	2,433,559	3,204,914
47	2,393,651	3,075,411	2,471,153	3,101,036
46	2,430,184	2,970,800		
45	2,466,820	2,865,910		

Albers projection tables for the Philippine Islands, Hawaiian Islands, Canal Zone, and Porto Rico: Computation of elements

| Latitude (degrees) | ρ | Log ρ | Scale factor | | Chords along parallel | | |
			Along parallel	Along meridian	1°	4°	8°
	Meters				*Meters*	*Meters*	*Meters*
23	26,525,243	7.4236594	1.0110	0.9891	103,753	415,007	829,989
22	26,634,835	7.4254500	1.0089	.9912	104,181	416,722	833,418
21	26,744,730	7.4272382	1.0061	.9939	104,612	418,441	836,857
20	26,854,893	7.4290235	1.0038	.9963	105,042	420,165	840,304
19	26,965,287	7.4308050	1.0017	.9983	105,474	421,892	843,758
18	27,075,875	7.4325825	1.0000	1.0000	105,906	423,622	847,219
17	27,186,623	7.4343553	.9986	1.0014	106,340	425,355	850,684
16	27,297,497	7.4361228	.9975	1.0025	106,773	427,090	854,153
15	27,408,461	7.4378846	.9968	1.0032	107,207	428,826	857,625
14	27,519,482	7.4396402	.9964	1.0037	107,642	430,563	861,099
13	27,630,525	7.4413891	.9962	1.0038	108,076	432,300	864,574
12	27,741,558	7.4431309	.9965	1.0036	108,510	434,037	868,048
11	27,852,548	7.4448649	.9968	1.0032	108,944	435,774	871,521
10	27,963,463	7.4465914	.9976	1.0024	109,378	437,509	874,992
9	28,074,270	7.4483082	.9987	1.0013	109,812	439,243	878,459
8	28,184,939	7.4500171	1.0000	1.0000	110,245	440,974	881,922
7	28,295,438	7.4517164	1.0016	.9984	110,677	442,703	885,379
6	28,405,737	7.4534061	1.0036	.9965	111,108	444,429	888,831
5	28,515,804	7.4550856	1.0058	.9943	111,539	446,151	892,275
4	28,625,611	7.4567548	1.0083	.9918	111,968	447,869	895,711
3	28,735,129	7.4584131	1.0120	.9882	112,397	449,583	899,138

Albers projection tables for the Philippine Islands, Hawaiian Islands, and Porto Rico: Spacings of parallels

Latitude (degrees)	Spacing of parallels on meridians	Latitude (degrees)	Spacing of parallels on meridians
	Meters		*Meters*
22–23	109,592	12–13	111,033
21–22	109,895	11–12	110,990
20–21	110,163	10–11	110,915
19–20	110,394	9–10	110,807
18–19	110,588	8–9	110,669
17–18	110,748	7–8	110,499
16–17	110,874	6–7	110,299
15–16	110,904	5–6	110,067
14–15	111,021	4–5	109,807
13–14	111,043	3–4	109,518

Albers projection tables for the Philippine Islands, Hawaiian Islands, Canal Zone, and Porto Rico: Angles between meridians and central meridian

[Colog *n* = 0.6495373]

Longitude from central meridian λ	nλ			Longitude from central meridian λ	nλ		
°	°	′	″	°	°	′	″
1	0	13	26.799	5	1	07	13.994
2	0	26	53.597	6	1	20	40.792
3	0	40	20.396	7	1	34	07.591
4	0	53	47.195	8	1	47	34.390

Albers projection tables for the Philippine Islands, Hawaiian Islands, Canal Zone, and Porto Rico: Coordinates

Latitude (degrees)	Longitude from central meridian									
	0°		1°		2°		3°		4°	
	x	y	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
23	0	2,209,886	103,753	2,210,089	207,504	2,210,698	311,252	2,211,712	414,995	2,213,132
22	0	2,100,294	104,181	2,100,498	208,361	2,101,109	312,537	2,102,127	416,709	2,103,554
21	0	1,990,399	104,011	1,990,604	209,220	1,991,217	313,827	1,992,240	418,429	1,993,072
20	0	1,880,236	105,042	1,880,442	210,082	1,881,057	315,120	1,882,085	420,152	1,883,523
19	0	1,769,842	105,473	1,770,048	210,946	1,770,667	316,415	1,771,698	421,879	1,773,142
18	0	1,659,254	105,906	1,659,461	211,811	1,660,082	317,713	1,661,118	423,610	1,662,568
17	0	1,548,506	106,339	1,548,714	212,677	1,549,338	319,013	1,550,377	425,342	1,551,833
16	0	1,437,632	106,773	1,437,841	213,545	1,438,467	320,314	1,439,511	427,077	1,440,973
15	0	1,326,608	107,207	1,326,878	214,413	1,327,506	321,616	1,328,555	428,813	1,330,023
14	0	1,215,647	107,641	1,215,858	215,281	1,216,489	322,918	1,217,541	430,550	1,219,015
13	0	1,104,604	108,075	1,104,816	216,150	1,105,449	324,221	1,106,506	432,287	1,107,986
12	0	993,571	108,510	993,783	217,018	994,420	325,524	995,481	434,024	996,966
11	0	882,581	108,944	882,794	217,887	883,433	326,827	884,498	435,761	885,990
10	0	771,666	109,378	771,880	218,754	772,521	328,128	773,591	437,496	775,089
9	0	660,859	109,811	661,074	219,621	661,718	329,428	662,792	439,230	664,205
8	0	550,190	110,244	550,406	220,487	551,052	330,727	552,130	440,961	553,640
7	0	439,691	110,676	439,908	221,351	440,557	332,024	441,039	442,690	443,154
6	0	329,392	111,108	329,609	222,214	330,261	333,318	331,347	444,416	332,869
5	0	219,325	111,538	219,543	223,075	220,197	334,609	221,288	446,138	222,815
4	0	109,518	111,968	109,737	223,934	110,394	335,898	111,488	447,850	113,022
3	0	0	112,396	220	224,791	879	337,183	1,978	449,569	3,517

Latitude (degrees)	Longitude from central meridian							
	5°		6°		7°		8°	
	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
23	518,731	2,214,959	622,459	2,217,191	726,178	2,219,828	829,886	2,222,870
22	520,874	2,105,387	625,031	2,107,629	729,179	2,110,277	833,315	2,113,333
21	523,023	1,995,513	627,610	1,997,704	732,187	2,000,423	836,753	2,003,492
20	525,178	1,885,371	630,195	1,887,631	735,203	1,890,301	840,200	1,893,383
19	527,337	1,774,999	632,780	1,777,268	738,225	1,779,949	843,654	1,783,043
18	529,499	1,664,432	635,381	1,666,710	741,253	1,669,402	847,113	1,672,509
17	531,665	1,553,705	637,960	1,555,993	744,285	1,558,696	850,578	1,561,815
16	533,833	1,442,852	640,582	1,445,149	747,320	1,447,863	854,047	1,450,995
15	536,004	1,331,909	643,186	1,334,216	750,358	1,336,941	857,519	1,340,086
14	538,175	1,220,910	645,791	1,223,225	753,397	1,225,961	860,992	1,229,119
13	540,346	1,109,888	648,397	1,112,213	756,437	1,114,960	864,467	1,118,130
12	542,518	998,876	651,002	1,001,210	759,477	1,003,969	867,940	1,007,152
11	544,688	887,907	653,607	890,261	762,516	893,020	871,413	896,216
10	546,857	777,013	656,210	779,367	765,552	782,147	874,883	785,355
9	549,024	666,228	658,810	668,590	768,586	671,381	878,350	674,602
8	551,188	555,580	661,407	557,951	771,616	560,754	881,812	563,988
7	553,340	445,102	664,000	447,483	774,041	450,296	885,270	453,543
6	555,506	334,824	666,588	337,214	777,660	340,039	888,720	343,298
5	557,659	224,778	669,171	227,178	780,674	230,013	892,164	233,285
4	559,806	114,992	671,748	117,401	783,680	120,247	895,600	123,531
3	561,948	5,495	674,318	7,913	786,678	10,770	899,026	14,007

Albers projection tables for Alaska: Computation of elements

Latitude (degrees)	ρ	Log ρ	Scale factor		Chords along parallels				
			Along parallel	Along meridian	1°	4°	8°	16°	32°
	Meters				*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	2,253,381	6.3528347	1.0393	0.9622	33,930	135,703	271,282	541,580	1,075,312
72	2,361,235	6.3731392	1.0304	.9705	35,554	142,198	284,266	567,502	1,126,779
71	2,469,926	6.3926799	1.0231	.9775	37,191	148,742	297,349	593,620	1,178,636
70	2,579,316	6.4115046	1.0170	.9833	38,838	155,331	310,521	619,916	1,230,847
69	2,689,286	6.4296370	1.0121	.9881	40,494	161,953	323,760	646,346	1,283,325
68	2,799,732	6.4471165	1.0080	.9921	42,157	168,605	337,057	672,891	1,336,030
67	2,910,568	6.4639777	1.0047	.9953	43,826	175,279	350,400	699,530	1,388,921
66	3,021,717	6.4802537	1.0021	.9979	45,500	181,973	363,781	726,243	1,441,961
65	3,133,110	6.4959757	1.0000	1.0000	47,177	188,681	377,192	753,016	1,495,117
64	3,244,689	6.5111730	.9984	1.0016	48,857	195,401	390,624	779,833	1,548,363
63	3,356,401	6.5258738	.9973	1.0027	50,539	202,128	404,073	806,682	1,601,672
62	3,468,199	6.5401040	.9966	1.0034	52,223	208,861	417,533	833,561	1,655,022
61	3,580,041	6.5538880	.9963	1.0037	53,907	215,596	430,997	860,432	1,708,392
60	3,691,888	6.5672485	.9962	1.0038	55,591	222,332	444,462	887,313	1,761,766
59	3,803,705	6.5802069	.9965	1.0035	57,275	229,066	457,924	914,187	1,815,125
58	3,915,460	6.5927828	.9970	1.0030	58,957	235,796	471,378	941,047	1,868,454
57	4,027,124	6.6049950	.9978	1.0022	60,639	242,520	484,821	967,884	1,921,740
56	4,138,671	6.6168609	.9988	1.0012	62,318	249,238	498,250	994,603	1,974,970
55	4,250,075	6.6283965	1.0000	1.0000	63,996	255,947	511,662	1,021,468	2,028,132
54	4,361,312	6.6396172	1.0014	.9986	65,671	262,646	525,053	1,048,203	2,081,214
53	4,472,363	6.6505370	1.0030	.9970	67,343	269,333	538,423	1,074,893	2,134,208
52	4,583,206	6.6611745	1.0049	.9952	69,012	276,009	551,767	1,101,533	2,187,102
51	4,693,822	6.6715266	1.0068	.9932	70,678	282,670	565,084	1,128,119	2,239,888
50	4,804,192	6.6816204	1.0090	.9911	72,340	289,317	578,371	1,154,646	2,292,550

Albers projection tables for Alaska: Spacings of parallels

Latitude (degrees)	Spacing of parallels on meridians	Latitude (degrees)	Spacing of parallels on meridians
	Meters		*Meters*
72–73	107,854		
71–72	108,691		
70–71	109,390		
69–70	109,970	59–60	111,817
68–69	110,446	58–59	111,755
67–68	110,836	57–58	111,664
66–67	111,149	56–57	111,547
65–66	111,393	55–56	111,404
64–65	111,579	54–55	111,237
63–64	111,712	53–54	111,051
62–63	111,798	52–53	110,843
61–62	111,842	51–52	110,616
60–61	111,847	50–51	110,370

Albers projection tables for Alaska: Angles between meridians and central meridian

[Colog *n* = 0.0641182]

Longitude from central meridian λ	nλ			Longitude from central meridian λ	nλ			Longitude from central meridian λ	nλ		
°	°	′	″	°	°	′	″	°	°	′	″
1	0	51	45.88	11	9	29	24.65	21	18	07	03.42
2	1	43	31.75	12	10	21	10.53	22	18	58	49.30
3	2	35	17.63	13	11	12	56.40	23	19	50	35.17
4	3	27	03.51	14	12	04	42.28	24	20	42	21.05
5	4	18	49.39	15	12	56	28.16	25	21	34	06.93
6	5	10	35.26	16	13	48	14.03	26	22	25	52.80
7	6	02	21.14	17	14	39	59.91	27	23	17	38.68
8	6	54	07.02	18	15	31	45.79	28	24	09	24.56
9	7	45	52.89	19	16	23	31.66	29	25	01	10.44
10	8	37	38.77	20	17	15	17.54	30	25	52	56.31
								31	26	44	42.19
								32	27	36	28.07

Albers projection tables for Alaska: Coordinates

Latitude (degrees)	Longitude from central meridian									
	0°		1°		2°		3°		4°	
	x	y	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
73	0	2,550,811	33,930	2,551,066	67,851	2,551,833	101,758	2,553,110	135,641	2,554,897
72	0	2,442,957	35,553	2,443,225	71,099	2,444,028	106,628	2,445,366	142,133	2,447,239
71	0	2,334,289	37,190	2,334,569	74,372	2,335,409	111,536	2,336,809	148,676	2,338,768
70	0	2,224,876	38,837	2,225,168	77,065	2,226,046	116,476	2,227,507	155,261	2,229,553
69	0	2,114,906	40,493	2,115,211	80,977	2,116,125	121,442	2,117,649	161,880	2,119,783
68	0	2,004,460	42,156	2,004,777	84,302	2,005,729	126,430	2,007,316	168,528	2,009,537
67	0	1,893,624	43,825	1,893,954	87,640	1,894,944	131,435	1,896,593	175,200	1,898,901
66	0	1,782,475	45,498	1,782,818	90,987	1,783,845	136,454	1,785,558	181,891	1,787,954
65	0	1,671,082	47,176	1,671,437	94,341	1,672,502	141,484	1,674,278	188,596	1,676,763
64	0	1,559,503	48,856	1,559,871	97,700	1,560,974	146,523	1,562,813	195,312	1,565,387
63	0	1,447,791	50,538	1,448,171	101,064	1,449,313	151,568	1,451,215	202,037	1,453,877
62	0	1,335,993	52,221	1,336,386	104,431	1,337,566	156,616	1,339,531	208,766	1,342,282
61	0	1,224,151	53,905	1,224,557	107,798	1,225,774	161,607	1,227,803	215,499	1,230,643
60	0	1,112,304	55,589	1,112,723	111,166	1,113,978	166,717	1,116,070	222,231	1,118,999
59	0	1,000,487	57,273	1,000,918	114,533	1,002,212	171,767	1,004,367	228,962	1,007,384
58	0	888,732	58,956	889,176	117,898	890,507	176,813	892,726	235,689	895,832
57	0	777,068	60,637	777,525	121,260	778,894	181,856	781,176	242,411	784,371
56	0	665,521	62,317	665,990	124,619	667,308	186,893	669,743	249,125	673,026
55	0	554,117	63,994	554,599	127,973	556,044	191,924	558,453	255,831	561,824
54	3	442,880	65,669	443,374	131,323	444,858	196,947	447,329	262,527	450,788
53	0	331,829	67,341	332,336	134,667	333,857	201,962	336,391	269,212	339,939
52	0	220,986	69,010	221,506	138,004	223,064	206,907	225,661	275,884	229,297
51	0	110,370	70,676	110,902	141,335	112,498	211,963	115,158	282,542	118,881
50	0	0	72,337	545	144,658	2,178	216,947	4,901	289,186	8,712

Latitude (degrees)	Longitude from central meridian							
	5°		6°		7°		8°	
	x	y	x	y	x	y	x	y
	Meters	Meters	Meters	Meters	Meters	Meters	Meters	Meters
73	169,404	2,557,194	203,308	2,560,001	237,076	2,563,317	270,790	2,567,141
72	177,606	2,449,646	213,039	2,452,587	248,423	2,456,062	283,751	2,460,068
71	185,782	2,341,280	222,845	2,344,362	259,858	2,347,997	296,813	2,352,188
70	194,010	2,232,183	232,715	2,235,396	271,367	2,239,191	309,958	2,243,568
69	202,281	2,122,524	242,637	2,125,874	282,937	2,129,831	323,173	2,134,395
68	210,589	2,012,391	252,601	2,015,879	294,557	2,019,998	336,446	2,024,749
67	218,926	1,901,809	262,601	1,905,495	306,218	1,909,777	349,765	1,914,716
66	227,286	1,791,035	272,630	1,794,799	317,912	1,799,245	363,122	1,804,373
65	235,665	1,679,958	282,680	1,683,860	329,631	1,688,470	376,508	1,693,787
64	244,057	1,568,695	292,747	1,572,730	341,370	1,577,511	389,916	1,583,016
63	252,460	1,457,209	302,826	1,461,480	353,123	1,466,419	403,341	1,472,114
62	260,869	1,345,818	312,913	1,350,138	364,886	1,355,241	416,770	1,361,126
61	269,282	1,234,293	323,004	1,238,752	376,652	1,244,020	430,216	1,250,095
60	277,695	1,122,763	333,095	1,127,361	388,420	1,132,793	443,656	1,139,058
59	286,105	1,011,203	343,183	1,016,000	400,184	1,021,597	457,094	1,028,051
58	294,511	899,824	353,266	904,701	411,941	910,462	470,523	917,106
57	302,910	788,440	363,341	793,492	423,690	799,418	483,942	806,252
56	311,300	677,245	373,405	682,400	435,425	688,490	497,347	695,513
55	319,680	566,157	383,456	571,451	447,146	577,704	510,734	584,916
54	328,047	455,235	393,492	460,667	458,849	467,085	524,102	474,485
53	336,400	344,499	403,512	350,069	470,533	356,650	537,447	364,239
52	344,737	233,970	413,513	230,678	482,194	246,422	550,767	254,199
51	353,058	123,667	423,493	129,514	493,832	136,420	564,059	144,385
50	361,359	13,010	433,451	19,594	505,444	26,063	577,323	34,815

Albers projection tables for Alaska: Coordinates—Continued

Latitude (degrees)	Longitude from central meridian							
	9°		10°		11°		12°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	304, 443	2, 571, 472	338, 027	2, 576, 309	371, 534	2, 581, 651	404, 957	2, 587, 497
72	319, 015	2, 464, 606	354, 206	2, 469, 675	389, 317	2, 475, 273	424, 340	2, 481, 399
71	333, 699	2, 356, 935	370, 511	2, 362, 237	407, 238	2, 368, 093	443, 873	2, 374, 501
70	348, 478	2, 248, 525	386, 920	2, 254, 062	425, 274	2, 260, 177	463, 531	2, 266, 869
69	363, 336	2, 139, 563	403, 417	2, 145, 336	443, 400	2, 151, 712	483, 294	2, 158, 689
68	378, 258	2, 030, 130	419, 984	2, 036, 140	461, 616	2, 042, 777	503, 143	2, 050, 041
67	393, 232	1, 920, 310	436, 611	1, 926, 558	479, 890	1, 933, 458	523, 061	1, 941, 010
66	408, 249	1, 810, 180	453, 284	1, 816, 667	498, 216	1, 823, 831	543, 036	1, 831, 670
65	423, 299	1, 699, 809	469, 994	1, 706, 534	516, 583	1, 713, 962	563, 054	1, 722, 091
64	438, 374	1, 589, 253	486, 732	1, 596, 218	534, 980	1, 603, 910	583, 106	1, 612, 328
63	453, 467	1, 478, 565	503, 490	1, 485, 770	553, 399	1, 493, 727	603, 182	1, 502, 435
62	468, 571	1, 367, 792	520, 260	1, 375, 237	571, 832	1, 383, 459	623, 273	1, 392, 457
61	483, 681	1, 256, 975	537, 038	1, 264, 660	590, 272	1, 273, 148	643, 373	1, 282, 436
60	498, 793	1, 146, 154	553, 816	1, 154, 079	608, 713	1, 162, 832	663, 473	1, 172, 410
59	513, 900	1, 035, 362	570, 589	1, 043, 527	627, 149	1, 052, 545	683, 568	1, 062, 413
58	528, 098	924, 632	587, 353	933, 037	645, 575	942, 319	703, 651	952, 478
57	544, 085	813, 992	604, 104	822, 636	663, 986	832, 184	723, 718	842, 632
56	559, 155	703, 467	620, 837	712, 351	682, 378	722, 103	743, 705	732, 901
55	574, 206	593, 085	637, 549	602, 208	700, 746	612, 284	763, 785	623, 310
54	589, 235	482, 868	654, 235	492, 230	719, 087	502, 569	783, 776	513, 884
53	604, 239	372, 835	670, 894	382, 435	737, 397	393, 038	803, 733	404, 641
52	619, 214	263, 008	687, 521	272, 847	755, 672	283, 712	823, 652	295, 603
51	634, 159	153, 406	704, 115	163, 482	773, 911	174, 610	843, 531	186, 788
50	649, 070	44, 048	720, 671	54, 361	792, 108	65, 751	863, 366	78, 215

Latitude (degrees)	Longitude from central meridian							
	13°		14°		15°		16°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	438, 288	2, 593, 846	471, 520	2, 600, 696	504, 045	2, 608, 046	537, 656	2, 615, 893
72	459, 206	2, 488, 052	494, 089	2, 495, 230	528, 799	2, 502, 931	563, 390	2, 511, 154
71	480, 407	2, 381, 400	516, 832	2, 388, 968	553, 140	2, 397, 024	589, 323	2, 405, 625
70	501, 684	2, 274, 130	539, 722	2, 281, 977	577, 038	2, 290, 389	615, 424	2, 299, 372
69	523, 073	2, 166, 206	562, 733	2, 174, 441	602, 266	2, 183, 212	641, 662	2, 192, 578
68	544, 555	2, 057, 929	585, 844	2, 066, 440	627, 001	2, 075, 572	668, 015	2, 085, 322
67	566, 113	1, 949, 210	609, 037	1, 958, 058	651, 822	1, 967, 551	694, 460	1, 977, 680
66	587, 732	1, 840, 184	632, 295	1, 849, 369	676, 714	1, 859, 225	720, 980	1, 869, 748
65	609, 398	1, 730, 918	655, 604	1, 740, 442	701, 661	1, 750, 661	747, 559	1, 761, 572
64	631, 100	1, 621, 470	678, 951	1, 631, 333	726, 649	1, 641, 916	774, 181	1, 653, 216
63	652, 829	1, 511, 892	702, 327	1, 522, 094	751, 667	1, 533, 042	800, 836	1, 544, 730
62	674, 574	1, 402, 229	725, 721	1, 412, 775	776, 704	1, 424, 083	827, 511	1, 436, 161
61	696, 327	1, 292, 523	749, 124	1, 303, 405	801, 751	1, 315, 082	854, 196	1, 327, 550
60	718, 082	1, 182, 812	772, 528	1, 194, 034	826, 799	1, 206, 076	880, 883	1, 218, 933
59	739, 830	1, 073, 130	795, 920	1, 084, 693	851, 841	1, 097, 099	907, 562	1, 110, 345
58	761, 567	963, 509	819, 310	975, 412	876, 868	988, 182	934, 227	1, 001, 818
57	783, 286	853, 978	842, 676	866, 220	901, 875	879, 355	960, 870	893, 379
56	804, 982	744, 561	866, 017	757, 142	926, 856	770, 641	987, 485	785, 054
55	826, 650	635, 285	889, 329	648, 205	951, 805	662, 066	1, 014, 066	676, 867
54	848, 287	526, 172	912, 605	539, 430	976, 717	553, 655	1, 040, 607	568, 843
53	869, 886	417, 242	935, 842	430, 837	1, 001, 587	445, 424	1, 067, 104	461, 000
52	891, 445	308, 516	959, 036	322, 448	1, 026, 410	337, 397	1, 093, 551	353, 358
51	912, 960	200, 013	982, 183	214, 281	1, 051, 182	229, 590	1, 119, 944	245, 938
50	934, 428	91, 750	1, 005, 278	106, 354	1, 075, 900	122, 024	1, 146, 278	138, 754

Albers projection tables for Alaska: Coordinates—Continued

Latitude (degrees)	Longitude from central meridian							
	17°		18°		19°		20°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	570, 544	2, 624, 237	603, 304	2, 633, 075	635, 926	2, 042, 405	668, 404	2, 652, 225
72	597, 852	2, 519, 897	632, 180	2, 529, 158	666, 363	2, 538, 935	700, 396	2, 549, 225
71	625, 372	2, 414, 771	661, 280	2, 424, 458	697, 037	2, 434, 085	732, 636	2, 445, 449
70	053, 069	2, 308, 922	690, 567	2, 319, 058	727, 908	2, 329, 718	765, 084	2, 340, 959
69	680, 913	2, 202, 536	720, 009	2, 213, 083	758, 943	2, 224, 218	797, 704	2, 235, 938
08	708, 877	2, 095, 688	749, 579	2, 106, 669	790, 111	2, 118, 261	830, 464	2, 130, 463
67	736, 941	1, 988, 464	779, 254	1, 999, 879	821, 390	2, 011, 931	863, 341	2, 024, 615
66	765, 083	1, 880, 037	809, 012	1, 892, 788	852, 758	1, 905, 209	896, 310	1, 918, 468
05	793, 287	1, 773, 173	838, 836	1, 785, 462	884, 194	1, 798, 434	929, 352	1, 812, 088
04	821, 538	1, 665, 230	868, 709	1, 677, 956	915, 683	1, 691, 391	962, 449	1, 705, 531
63	849, 823	1, 557, 158	898, 618	1, 570, 322	947, 209	1, 584, 219	995, 585	1, 598, 847
62	878, 130	1, 449, 003	928, 550	1, 462, 606	978, 759	1, 476, 966	1, 028, 747	1, 492, 080
01	906, 448	1, 340, 805	958, 494	1, 354, 847	1, 010, 322	1, 369, 670	1, 061, 922	1, 385, 272
00	934, 767	1, 232, 603	988, 439	1, 247, 083	1, 041, 887	1, 262, 369	1, 095, 098	1, 278, 458
59	963, 078	1, 124, 429	1, 018, 376	1, 139, 348	1, 073, 442	1, 155, 097	1, 128, 266	1, 171, 674
58	991, 374	1, 016, 316	1, 048, 296	1, 031, 673	1, 104, 981	1, 047, 885	1, 161, 415	1, 064, 948
57	1, 019, 047	908, 291	1, 078, 192	924, 085	1, 136, 493	940, 759	1, 194, 537	958, 310
50	1, 047, 890	800, 378	1, 108, 057	810, 610	1, 167, 973	833, 747	1, 227, 624	851, 783
55	1, 076, 097	692, 604	1, 137, 884	709, 273	1, 199, 412	726, 871	1, 260, 669	745, 393
54	1, 104, 261	584, 992	1, 167, 665	602, 097	1, 230, 804	620, 155	1, 293, 665	639, 162
53	1, 132, 379	477, 560	1, 197, 397	495, 100	1, 262, 144	513, 618	1, 326, 605	533, 109
52	1, 160, 444	370, 328	1, 227, 074	388, 304	1, 293, 425	407, 281	1, 359, 483	427, 255
51	1, 188, 451	263, 317	1, 256, 689	281, 726	1, 324, 642	301, 161	1, 392, 295	321, 617
50	1, 216, 396	156, 543	1, 286, 239	175, 385	1, 355, 789	195, 277	1, 425, 033	216, 214

Latitude (degrees)	Longitude from central meridian							
	21°		22°		23°		24°	
	x	y	x	y	x	y	x	y
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	700, 731	2, 662, 533	732, 899	2, 673, 327	764, 901	2, 684, 604	796, 729	2, 696, 362
72	734, 270	2, 560, 027	767, 977	2, 571, 337	801, 511	2, 583, 154	834, 863	2, 595, 474
71	768, 070	2, 456, 748	803, 329	2, 468, 579	838, 406	2, 480, 939	873, 293	2, 493, 827
70	802, 086	2, 352, 758	838, 907	2, 365, 113	875, 538	2, 378, 021	911, 970	2, 391, 479
69	836, 284	2, 248, 240	874, 674	2, 261, 122	912, 866	2, 274, 581	950, 852	2, 288, 613
68	870, 629	2, 143, 270	910, 596	2, 156, 681	950, 357	2, 170, 692	989, 902	2, 185, 300
67	905, 095	2, 037, 925	946, 645	2, 051, 871	987, 980	2, 066, 437	1, 029, 090	2, 081, 624
66	939, 659	1, 932, 291	982, 795	1, 946, 765	1, 025, 709	1, 961, 887	1, 068, 389	1, 977, 654
05	974, 299	1, 826, 421	1, 019, 025	1, 841, 429	1, 063, 520	1, 857, 108	1, 107, 775	1, 873, 456
64	1, 008, 997	1, 720, 376	1, 055, 316	1, 735, 910	1, 101, 396	1, 752, 154	1, 147, 226	1, 769, 084
63	1, 043, 735	1, 614, 201	1, 091, 649	1, 630, 278	1, 139, 316	1, 647, 075	1, 186, 724	1, 664, 588
62	1, 078, 501	1, 507, 946	1, 128, 011	1, 524, 559	1, 177, 265	1, 541, 915	1, 226, 252	1, 560, 011
61	1, 113, 280	1, 401, 649	1, 164, 387	1, 418, 797	1, 215, 229	1, 436, 713	1, 265, 796	1, 455, 393
60	1, 148, 061	1, 295, 347	1, 200, 764	1, 313, 032	1, 253, 195	1, 331, 507	1, 305, 342	1, 350, 771
59	1, 182, 833	1, 189, 074	1, 237, 132	1, 207, 294	1, 291, 151	1, 226, 329	1, 344, 877	1, 246, 176
58	1, 217, 585	1, 082, 860	1, 273, 480	1, 101, 615	1, 329, 086	1, 121, 210	1, 384, 390	1, 141, 640
57	1, 252, 309	976, 732	1, 309, 798	996, 022	1, 366, 990	1, 016, 176	1, 423, 872	1, 037, 188
56	1, 286, 997	870, 716	1, 346, 078	890, 540	1, 404, 854	911, 252	1, 463, 311	932, 846
55	1, 321, 640	764, 835	1, 382, 311	785, 193	1, 442, 669	806, 462	1, 502, 700	829, 638
54	1, 356, 231	659, 113	1, 418, 490	680, 004	1, 480, 428	701, 830	1, 542, 031	724, 586
53	1, 390, 765	553, 568	1, 454, 609	574, 991	1, 518, 124	597, 372	1, 581, 295	620, 708
52	1, 425, 233	448, 221	1, 490, 660	470, 174	1, 555, 749	493, 111	1, 620, 486	517, 025
51	1, 459, 631	343, 089	1, 526, 637	365, 573	1, 593, 297	389, 062	1, 659, 596	413, 554
50	1, 493, 953	238, 191	1, 562, 535	261, 203	1, 630, 762	285, 246	1, 698, 020	310, 313

Albers projection tables for Alaska: Coordinates—Continued

Latitude (degrees)	Longitude from central meridian							
	25°		20°		27°		28°	
	x	*y*	*x*	*y*	*x*	*y*	*x*	*y*
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	828,376	2,708,597	859,836	2,721,307	891,101	2,734,490	922,164	2,748,142
72	868,025	2,608,295	900,991	2,621,614	933,752	2,635,428	966,301	2,649,733
71	907,981	2,507,238	942,464	2,521,170	976,734	2,535,619	1,010,781	2,550,583
70	948,195	2,405,484	984,205	2,420,033	1,019,992	2,435,133	1,055,548	2,450,750
69	988,621	2,303,215	1,026,167	2,318,384	1,063,480	2,334,117	1,100,551	2,350,410
68	1,029,229	2,200,502	1,068,310	2,216,295	1,107,156	2,232,674	1,145,750	2,249,636
67	1,069,968	2,097,427	1,110,603	2,113,845	1,150,986	2,130,872	1,191,108	2,148,506
66	1,110,828	1,994,061	1,153,015	2,011,106	1,194,940	2,028,783	1,236,594	2,047,090
65	1,151,778	1,890,468	1,195,519	1,908,141	1,238,990	1,926,471	1,282,180	1,945,452
64	1,192,796	1,786,702	1,238,095	1,805,004	1,283,114	1,823,987	1,327,842	1,843,644
63	1,233,863	1,682,812	1,280,722	1,701,745	1,327,291	1,721,381	1,373,558	1,741,715
62	1,274,961	1,578,843	1,323,381	1,598,406	1,371,501	1,618,695	1,419,310	1,639,707
61	1,316,076	1,474,832	1,366,058	1,495,026	1,415,729	1,515,970	1,465,080	1,537,660
60	1,357,193	1,370,817	1,408,736	1,391,641	1,459,959	1,413,240	1,510,852	1,435,607
59	1,398,298	1,266,829	1,451,402	1,288,285	1,504,177	1,310,537	1,556,611	1,333,582
58	1,439,381	1,162,900	1,494,045	1,184,985	1,548,371	1,207,892	1,602,345	1,231,614
57	1,480,431	1,059,055	1,536,654	1,081,770	1,592,528	1,105,330	1,648,042	1,129,728
56	1,521,437	955,318	1,579,217	978,663	1,636,640	1,002,875	1,693,691	1,027,949
55	1,562,391	851,715	1,621,720	875,688	1,680,694	900,552	1,739,281	926,301
54	1,603,283	748,267	1,664,172	772,867	1,724,683	798,383	1,784,804	824,804
53	1,644,107	644,992	1,706,546	670,219	1,768,598	696,384	1,830,250	723,479
52	1,684,854	541,911	1,748,841	567,703	1,812,431	594,576	1,875,610	622,343
51	1,725,519	439,040	1,791,050	465,516	1,856,174	492,976	1,920,878	521,414
50	1,766,092	336,398	1,833,164	363,497	1,899,820	391,603	1,966,046	420,709

Latitude (degrees)	Longitude from central meridian							
	29°		30°		31°		32°	
	x	*y*	*x*	*y*	*x*	*y*	*x*	*y*
	Meters	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*	*Meters*
73	953,018	2,762,261	983,656	2,776,842	1,014,070	2,791,883	1,044,254	2,807,380
72	998,632	2,664,527	1,030,736	2,679,806	1,062,606	2,695,567	1,094,235	2,711,806
71	1,044,600	2,566,058	1,078,182	2,582,040	1,111,519	2,598,527	1,144,605	2,615,513
70	1,090,864	2,466,910	1,125,933	2,483,601	1,160,747	2,500,817	1,195,298	2,518,556
69	1,137,374	2,367,259	1,173,938	2,384,661	1,210,236	2,402,612	1,246,260	2,421,107
68	1,184,084	2,267,177	1,222,150	2,285,294	1,259,939	2,303,981	1,297,442	2,323,236
67	1,230,960	2,166,742	1,270,533	2,185,576	1,309,818	2,205,003	1,348,806	2,225,020
66	1,277,968	2,066,023	1,319,052	2,085,576	1,359,837	2,105,745	1,400,314	2,126,526
65	1,325,079	1,965,082	1,367,658	1,985,350	1,409,966	2,006,269	1,451,935	2,027,816
64	1,372,209	1,863,974	1,416,385	1,884,969	1,460,179	1,906,627	1,503,643	1,928,942
63	1,419,515	1,762,748	1,465,150	1,784,463	1,510,452	1,806,866	1,555,412	1,829,949
62	1,466,798	1,661,437	1,513,952	1,683,879	1,560,764	1,707,028	1,607,221	1,730,880
61	1,514,099	1,560,090	1,562,774	1,583,256	1,611,095	1,607,152	1,659,050	1,631,773
60	1,561,402	1,458,738	1,611,598	1,482,628	1,661,428	1,507,270	1,710,882	1,532,660
59	1,608,692	1,357,414	1,660,409	1,382,027	1,711,748	1,407,416	1,762,700	1,433,575
58	1,655,957	1,256,145	1,709,192	1,281,482	1,762,041	1,307,616	1,814,489	1,334,544
57	1,703,183	1,154,960	1,757,936	1,181,018	1,812,292	1,207,898	1,866,236	1,235,594
56	1,750,359	1,053,880	1,806,629	1,080,660	1,862,490	1,108,285	1,917,929	1,136,748
55	1,797,475	952,930	1,855,260	980,431	1,912,624	1,008,799	1,969,555	1,038,028
54	1,844,520	852,131	1,903,817	880,352	1,962,683	909,463	2,021,104	939,457
53	1,891,487	751,500	1,952,294	780,440	2,012,659	810,292	2,072,567	841,050
52	1,938,365	651,058	2,000,679	680,716	2,062,541	711,307	2,123,984	742,827
51	1,985,148	550,822	2,048,966	581,195	2,112,320	612,525	2,175,195	644,806
50	2,031,826	450,809	2,097,145	481,896	2,161,989	513,963	2,226,342	547,003