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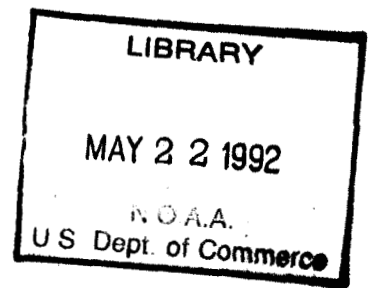
Charles Sawyer, Secretary

Coast and Geodetic Survey

Robert F. A. Studds, Director

Special Publication No. 284

PLANE COORDINATE PROJECTION TABLES
IOWA



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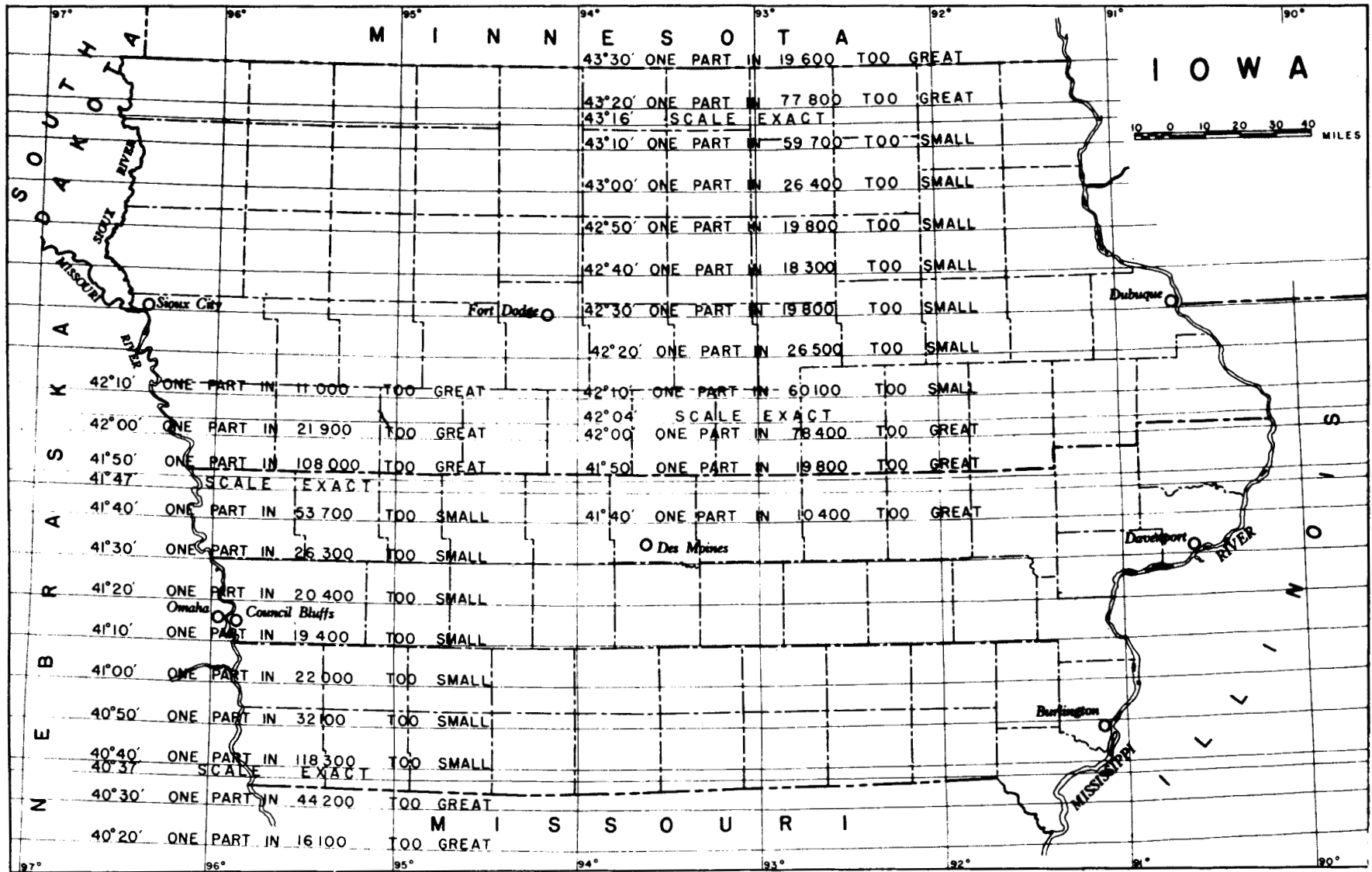
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STATE PLANE-COORDINATE ZONES AND SCALE FACTORS

Foreword

The plane coordinate system used in this State is based on the Lambert conformal conic projection with two standard parallels for each zone. The tables in this publication are to be used for the conversion of geographic positions to plane coordinates or plane coordinates to geographic positions. The constants of the projection are listed with the tables.

The methods of computation have been designed for machine calculation, using tables of natural trigonometric functions. A table of these functions has been published by the Coast and Geodetic Survey to ten decimal places with ten-second intervals for 0° to 6° in Special Publication No. 246 and is sold for a nominal sum by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

The formulas and sample computations which follow show the general methods for computing either type of coordinates.

Plane Coordinates from Geographic Positions

$$x = R \sin \theta + C$$

$$y = R_b - R \cos \theta$$

Grid azimuth = geodetic azimuth - θ + second term

where

R is the radius for the latitude of the station,

R_b is a constant for a zone,

θ is the mapping angle for the longitude of the station,

and

C is the value of x assigned to the Central Meridian for a zone.

The second term for the reduction of geodetic to grid azimuths may be neglected for most work. However, for lines five miles or more in length, if the same degree of accuracy is desired as is obtained by geographic computations, this term should be evaluated and used.

$$\text{Second term} = \frac{x_2 - x_1}{2 \rho_0^2 \sin 1''} \left(y_1 - y_0 + \frac{y_2 - y_1}{3} \right)$$

Geographic Positions from Plane Coordinates

The formulas show the method of computing R and θ from which the latitude and longitude may be obtained.

$$x' = x - C$$

$$\tan \theta = x' \div (R_p - y)$$

$$R = (R_p - y) \div \cos \theta$$

$$\Delta \lambda = \theta \div l$$

$$\lambda = \text{Central Meridian} - \Delta \lambda$$

where

R , R_p , θ , and C are the same as previously defined

and

l is a constant for a zone.

PLANE COORDINATES ON LAMBERT PROJECTION

(Condensed form for calculating-machine computation)

$X = R \sin \theta + C$
 $C = 2,000,000.00$

$Y = R_b - R \cos \theta$
 $R_b = 23,162,461.59$

State-Zone Iowa - North
Grid Az. = Geod. Az. - θ

Station	Latitude	R	sin θ	X
	Longitude	θ	cos θ	Y
1 Rowan, 1938	42 44 50.101	22,707,939.42	+0.00028 26900	2,006,419.31
	93 28 33966	+0 00 58.3090	0.99999 99601	454,523.08
	Grid azimuth to azimuth mark			35 20 03
2 Eagle, 1938	42 40 23699	22,734,907.74	-0.00480 40948	1,890,779.35
	93 54 22084	-0 16 30.9195	0.99998 84603	427,816.20
	Grid azimuth to azimuth mark			206 34 22
3				
	Grid azimuth to azimuth mark			0 1 "
4				
	Grid azimuth to azimuth mark			0 1 "
5				
	Grid azimuth to azimuth mark			0 1 "
6				
	Grid azimuth to azimuth mark			0 1 "
7				
	Grid azimuth to azimuth mark			0 1 "
8				
	Grid azimuth to azimuth mark			0 1 "
9				
	Grid azimuth to azimuth mark			0 1 "
10				
	Grid azimuth to azimuth mark			0 1 "
11				
	Grid azimuth to azimuth mark			0 1 "
12				
	Grid azimuth to azimuth mark			0 1 "

GEODETIC POSITIONS FROM LAMBERT COORDINATES
(CALCULATING MACHINE COMPUTATION)

STATE - ZONE Iowa - North $l =$ 0.67774 45518

Station Rowan, 1938

C	- 2,000,000.00	R_b	23,162,461.59
X	2,006,419.31	Y	- 454,523.08
$X' = X - C$	+ 6,419.31	$R_b - Y$	22,707,938.51
$\tan \theta = X' \div (R_b - Y)$	+0.00028 26901	θ	+58.3090
θ	+0 00 58.3090	$\Delta \lambda = \theta \div l$	+86.034
$\cos \theta$	0.99999 99601	$\Delta \lambda$	+0 01 26.034
$R = (R_b - Y) \div \cos \theta$	22,707,939.42	Central Meridian	93 30 00.000
ϕ	42 44 50.101	$\lambda = C.M. - \Delta \lambda$	93 28 33.966

Station Eagle, 1938

C	- 2,000,000.00	R_b	23,162,461.59
X	1,890,779.35	Y	- 427,816.20
$X' = X - C$	- 109,220.65	$R_b - Y$	22,734,645.39
$\tan \theta = X' \div (R_b - Y)$	-0.00480 41501	θ	-990.9195
θ	-0 16 30.9195	$\Delta \lambda = \theta \div l$	-1462.084
$\cos \theta$	0.99998 84603	$\Delta \lambda$	-0 24 22.084
$R = (R_b - Y) \div \cos \theta$	22,734,907.74	Central Meridian	93 30 00.000
ϕ	42 40 23.699	$\lambda = C.M. - \Delta \lambda$	93 54 22.084

Station

C	-	R_b	
X		Y	-
$X' = X - C$		$R_b - Y$	
$\tan \theta = X' \div (R_b - Y)$		θ	"
θ		$\Delta \lambda = \theta \div l$	"
$\cos \theta$		$\Delta \lambda$	"
$R = (R_b - Y) \div \cos \theta$		Central Meridian	"
ϕ		$\lambda = C.M. - \Delta \lambda$	"

Station

C	-	R_b	
X		Y	-
$X' = X - C$		$R_b - Y$	
$\tan \theta = X' \div (R_b - Y)$		θ	"
θ		$\Delta \lambda = \theta \div l$	"
$\cos \theta$		$\Delta \lambda$	"
$R = (R_b - Y) \div \cos \theta$		Central Meridian	"
ϕ		$\lambda = C.M. - \Delta \lambda$	"

Constants for Iowa

Constant	North zone	South zone
C	2,000,000.00 ft.	2,000,000.00 ft.
Central Meridian	93° 30' 00" 000	93° 30' 00" 000
R_b	23,162,461.59 ft.	24,374,096.67 ft.
y_0	425,511.25 ft.	437,511.56 ft.
l	0.67774 45518	0.65870 10213
$\frac{1}{2\rho_0^2 \sin 1''}$	2.357×10^{-10}	2.357×10^{-10}
$\log \frac{1}{2\rho_0^2 \sin 1''}$	0.372 2745 - 10	0.372 4245 - 10
$\log l$	9.83106 60352 - 10	9.81868 83368 - 10
$\log K$	7.59819 11968	7.60392 84611

Lambert Projection for Iowa - North

Table I.

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
41° 30'	23,162,461.59	0	101.23050	+655.4	1.0001509
31	23,156,387.76	6,073.83	101.23033	+630.2	1.0001451
32	23,150,313.94	12,147.65	101.23000	+605.3	1.0001394
33	23,144,240.14	18,221.45	101.22983	+580.8	1.0001337
34	23,138,166.35	24,295.24	101.22950	+556.7	1.0001282
35	23,132,092.58	30,369.01	101.22933	+532.9	1.0001227
41° 36'	23,126,018.82	36,442.77	101.22900	+509.5	1.0001173
37	23,119,945.08	42,516.51	101.22883	+486.4	1.0001120
38	23,113,871.35	48,590.24	101.22850	+463.7	1.0001068
39	23,107,797.64	54,663.95	101.22833	+441.4	1.0001016
40	23,101,723.94	60,737.65	101.22817	+419.4	1.0000966
41° 41'	23,095,650.25	66,811.34	101.22783	+397.8	1.0000916
42	23,089,576.58	72,885.01	101.22767	+376.5	1.0000867
43	23,083,502.92	78,958.67	101.22767	+355.6	1.0000819
44	23,077,429.26	85,032.33	101.22733	+335.0	1.0000771
45	23,071,355.62	91,105.97	101.22717	+314.8	1.0000725
41° 46'	23,065,281.99	97,179.60	101.22700	+295.0	1.0000679
47	23,059,208.37	103,253.22	101.22700	+275.5	1.0000634
48	23,053,134.75	109,326.84	101.22667	+256.4	1.0000590
49	23,047,061.15	115,400.44	101.22667	+237.7	1.0000547
50	23,040,987.55	121,474.04	101.22650	+219.3	1.0000505
41° 51'	23,034,913.96	127,547.63	101.22633	+201.3	1.0000464
52	23,028,840.38	133,621.21	101.22617	+183.6	1.0000423
53	23,022,766.81	139,694.78	101.22617	+166.3	1.0000383
54	23,016,693.24	145,768.35	101.22617	+149.4	1.0000344
55	23,010,619.67	151,841.92	101.22600	+132.8	1.0000306
41° 56'	23,004,546.11	157,915.48	101.22583	+116.6	1.0000268
57	22,998,472.56	163,989.03	101.22583	+100.8	1.0000232
58	22,992,399.01	170,062.58	101.22583	+ 85.3	1.0000196
59	22,986,325.46	176,136.13	101.22567	+ 70.2	1.0000162
42° 00	22,980,251.92	182,209.67	101.22567	+ 55.4	1.0000128
42° 01'	22,974,178.38	188,283.21	101.22567	+ 41.0	1.0000094
02	22,968,104.84	194,356.75	101.22567	+ 27.0	1.0000062
03	22,962,031.30	200,430.29	101.22550	+ 13.3	1.0000031
04	22,955,957.77	206,503.82	101.22567	0.0	1.0000000
05	22,949,884.23	212,577.36	101.22567	- 13.0	0.9999970

Lambert Projection for Iowa - North

Table I. (Cont'd)

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
42° 06'	22,943,810.69	218,650.90	101.22550	- 25.6	0.9999941
07	22,937,737.16	224,724.43	101.22567	- 37.8	0.9999913
08	22,931,663.62	230,797.97	101.22567	- 49.7	0.9999886
09	22,925,590.08	236,871.51	101.22567	- 61.2	0.9999859
10	22,919,516.54	242,945.05	101.22567	- 72.3	0.9999834
42° 11'	22,913,443.00	249,018.59	101.22583	- 83.1	0.9999809
12	22,907,369.45	255,092.14	101.22583	- 93.5	0.9999785
13	22,901,295.90	261,165.69	101.22600	-103.6	0.9999761
14	22,895,222.34	267,239.25	101.22600	-113.3	0.9999739
15	22,889,148.78	273,312.81	101.22600	-122.6	0.9999718
42° 16'	22,883,075.22	279,386.37	101.22617	-131.6	0.9999697
17	22,877,001.65	285,459.94	101.22633	-140.2	0.9999677
18	22,870,928.07	291,533.52	101.22633	-148.4	0.9999658
19	22,864,854.49	297,607.10	101.22650	-156.3	0.9999640
20	22,858,780.90	303,680.69	101.22667	-163.8	0.9999623
42° 21'	22,852,707.30	309,754.29	101.22683	-170.9	0.9999606
22	22,846,633.69	315,827.90	101.22683	-177.7	0.9999591
23	22,840,560.08	321,901.51	101.22700	-184.1	0.9999576
24	22,834,486.46	327,975.13	101.22733	-190.2	0.9999562
25	22,828,412.82	334,048.77	101.22733	-195.9	0.9999549
42° 26'	22,822,339.18	340,122.41	101.22767	-201.2	0.9999537
27	22,816,265.52	346,196.07	101.22767	-206.1	0.9999525
28	22,810,191.86	352,269.73	101.22800	-210.7	0.9999515
29	22,804,118.18	358,343.41	101.22817	-214.9	0.9999505
30	22,798,044.49	364,417.10	101.22833	-218.8	0.9999496
42° 31'	22,791,970.79	370,490.80	101.22867	-222.3	0.9999488
32	22,785,897.07	376,564.52	101.22883	-225.4	0.9999481
33	22,779,823.34	382,638.25	101.22900	-228.2	0.9999475
34	22,773,749.60	388,711.99	101.22933	-230.6	0.9999469
35	22,767,675.84	394,785.75	101.22950	-232.6	0.9999464
42° 36'	22,761,602.07	400,859.52	101.22983	-234.3	0.9999461
37	22,755,528.28	406,933.31	101.23017	-235.6	0.9999458
38	22,749,454.47	413,007.12	101.23033	-236.5	0.9999455
39	22,743,380.65	419,080.94	101.23067	-237.1	0.9999454
40	22,737,306.81	425,154.78	101.23100	-237.3	0.9999454

Lambert Projection for Iowa - North

Table I. (Cont'd)

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
42° 41'	22,731,232.95	431,228.64	101.23133	-237.1	0.9999454
42° 42'	22,725,159.07	437,302.52	101.23167	-236.6	0.9999455
42° 43'	22,719,085.17	443,376.42	101.23183	-235.7	0.9999457
42° 44'	22,713,011.26	449,450.33	101.23233	-234.5	0.9999460
42° 45'	22,706,937.32	455,524.27	101.23250	-232.8	0.9999464
42° 46'	22,700,863.37	461,598.22	101.23300	-230.8	0.9999469
42° 47'	22,694,789.39	467,672.20	101.23333	-228.5	0.9999474
42° 48'	22,688,715.39	473,746.20	101.23367	-225.8	0.9999480
42° 49'	22,682,641.37	479,820.22	101.23400	-222.7	0.9999487
42° 50'	22,676,567.33	485,894.26	101.23450	-219.2	0.9999495
42° 51'	22,670,493.26	491,968.33	101.23483	-215.4	0.9999504
42° 52'	22,664,419.17	498,042.42	101.23517	-211.2	0.9999514
42° 53'	22,658,345.06	504,116.53	101.23567	-206.6	0.9999524
42° 54'	22,652,270.92	510,190.67	101.23600	-201.7	0.9999536
42° 55'	22,646,196.76	516,264.83	101.23650	-196.4	0.9999548
42° 56'	22,640,122.57	522,339.02	101.23700	-190.7	0.9999561
42° 57'	22,634,048.35	528,413.24	101.23733	-184.7	0.9999575
42° 58'	22,627,974.11	534,487.48	101.23783	-178.3	0.9999589
42° 59'	22,621,899.84	540,561.75	101.23817	-171.5	0.9999605
43° 00'	22,615,825.55	546,636.04	101.23883	-164.4	0.9999621
43° 01'	22,609,751.22	552,710.37	101.23917	-156.9	0.9999639
43° 02'	22,603,676.87	558,784.72	101.23967	-149.0	0.9999657
43° 03'	22,597,602.49	564,859.10	101.24017	-140.8	0.9999676
43° 04'	22,591,528.08	570,933.51	101.24083	-132.1	0.9999696
43° 05'	22,585,453.63	577,007.96	101.24117	-123.2	0.9999716
43° 06'	22,579,379.16	583,082.43	101.24183	-113.8	0.9999738
43° 07'	22,573,304.65	589,156.94	101.24217	-104.1	0.9999760
43° 08'	22,567,230.12	595,231.47	101.24283	-94.0	0.9999784
43° 09'	22,561,155.55	601,306.04	101.24333	-83.5	0.9999808
43° 10'	22,555,080.95	607,380.64	101.24400	-72.7	0.9999833
43° 11'	22,549,006.31	613,455.28	101.24450	-61.5	0.9999858
43° 12'	22,542,931.64	619,529.95	101.24500	-50.0	0.9999885
43° 13'	22,536,856.94	625,604.65	101.24567	-38.0	0.9999913
43° 14'	22,530,782.20	631,679.39	101.24617	-25.7	0.9999941
43° 15'	22,524,707.43	637,754.16	101.24683	-13.1	0.9999970

Lambert Projection for Iowa - North

Table I. (Cont'd)

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
43° 16'	22,518,632.62	643,828.97	101.24750	0.0	1.0000000
17	22,512,557.77	649,903.82	101.24800	+ 13.4	1.0000031
18	22,506,482.89	655,978.70	101.24867	+ 27.1	1.0000062
19	22,500,407.97	662,053.62	101.24933	+ 41.3	1.0000095
20	22,494,333.01	668,128.58	101.24983	+ 55.8	1.0000128
43° 21'	22,488,258.02	674,203.57	101.25067	+ 70.7	1.0000163
22	22,482,182.98	680,278.61	101.25133	+ 86.0	1.0000198
23	22,476,107.90	686,353.69	101.25183	+ 101.6	1.0000234
24	22,470,032.79	692,428.80	101.25267	+ 117.6	1.0000271
25	22,463,957.63	698,503.96	101.25333	+ 134.0	1.0000309
43° 26'	22,457,882.43	704,579.16	101.25400	+ 150.7	1.0000347
27	22,451,807.19	710,654.40	101.25467	+ 167.8	1.0000386
28	22,445,731.91	716,729.68	101.25533	+ 185.3	1.0000427
29	22,439,656.59	722,805.00	101.25617	+ 203.2	1.0000468
30	22,433,581.22	728,880.37	101.25683	+ 221.4	1.0000510
43° 31'	22,427,505.81	734,955.78	101.25750	+ 240.0	1.0000553
32	22,421,430.36	741,031.23	101.25833	+ 259.0	1.0000596
33	22,415,354.86	747,106.73	101.25917	+ 278.3	1.0000641
34	22,409,279.31	753,182.28	101.25983	+ 298.0	1.0000686
35	22,403,203.72	759,257.87	101.26067	+ 318.1	1.0000732
43° 36'	22,397,128.08	765,333.51	101.26133	+ 338.6	1.0000780
37	22,391,052.40	771,409.19	101.26217	+ 359.4	1.0000828
38	22,384,976.67	777,484.92	101.26300	+ 380.6	1.0000876
39	22,378,900.89	783,560.70	101.26383	+ 402.2	1.0000926
40	22,372,825.06	789,636.53	101.26467	+ 424.1	1.0000977
43° 41'	22,366,749.18	795,712.41	101.26533	+ 446.4	1.0001028
42	22,360,673.26	801,788.33	101.26633	+ 469.1	1.0001080
43	22,354,597.28	807,864.31	101.26717	+ 492.2	1.0001133
44	22,348,521.25	813,940.34	101.26800	+ 515.6	1.0001187
45	22,342,445.17	820,016.42	101.26867	+ 539.4	1.0001242
43° 46'	22,336,369.05	826,092.54	101.26983	+ 563.6	1.0001298
47	22,330,292.86	832,168.73	101.27050	+ 588.1	1.0001354
48	22,324,216.63	838,244.96	101.27150	+ 613.0	1.0001411
49	22,318,140.34	844,321.25	101.27233	+ 638.3	1.0001470
50	22,312,064.00	850,397.59		+ 664.0	1.0001529

Lambert Projection for Iowa - North

Table II.

1" of Long. = 0.67774455 of θ

Long.	θ	Long.	θ	Long.	θ
89° 30'	+2° 42' 39.5215	90° 06'	+2° 18' 15.5933	90° 41'	+1° 54' 32.3298
31	+2 41 58.8569	07	+2 17 34.9286	42	+1 53 51.6651
32	+2 41 18.1922	08	+2 16 54.2640	43	+1 53 11.0004
33	+2 40 37.5275	09	+2 16 13.5993	44	+1 52 30.3357
34	+2 39 56.8629	10	+2 15 32.9346	45	+1 51 49.6711
35	+2 39 16.1982				
89° 36'	+2 38 35.5335	90° 11'	+2 14 52.2699	90° 46'	+1 51 09.0064
37	+2 37 54.8688	12	+2 14 11.6053	47	+1 50 28.3417
38	+2 37 14.2042	13	+2 13 30.9406	48	+1 49 47.6770
39	+2 36 33.5395	14	+2 12 50.2759	49	+1 49 07.0124
40	+2 35 52.8748	15	+2 12 09.6113	50	+1 48 26.3477
89° 41'	+2 35 12.2101	90° 16'	+2 11 28.9466	90° 51'	+1 47 45.6830
42	+2 34 31.5455	17	+2 10 48.2819	52	+1 47 05.0184
43	+2 33 50.8808	18	+2 10 07.6172	53	+1 46 24.3537
44	+2 33 10.2161	19	+2 09 26.9526	54	+1 45 43.6890
45	+2 32 29.5514	20	+2 08 46.2879	55	+1 45 03.0243
89° 46'	+2 31 48.8868	90° 21'	+2 08 05.6232	90° 56'	+1 44 22.3597
47	+2 31 08.2221	22	+2 07 24.9585	57	+1 43 41.6950
48	+2 30 27.5574	23	+2 06 44.2939	58	+1 43 01.0303
49	+2 29 46.8928	24	+2 06 03.6292	59	+1 42 20.3656
50	+2 29 06.2281	25	+2 05 22.9645	91° 00'	+1 41 39.7010
89° 51'	+2 28 25.5634	90° 26'	+2 04 42.2999	91° 01'	+1 40 59.0363
52	+2 27 44.8987	27	+2 04 01.6352	02	+1 40 18.3716
53	+2 27 04.2341	28	+2 03 20.9705	03	+1 39 37.7069
54	+2 26 23.5694	29	+2 02 40.3058	04	+1 38 57.0423
55	+2 25 42.9047	30	+2 01 59.6412	05	+1 38 16.3776
89° 56'	+2 25 02.2400	90° 31'	+2 01 18.9765	91° 06'	+1 37 35.7129
57	+2 24 21.5754	32	+2 00 38.3118	07	+1 36 55.0483
58	+2 23 40.9107	33	+1 59 57.6471	08	+1 36 14.3836
59	+2 23 00.2460	34	+1 59 16.9825	09	+1 35 33.7189
90° 00'	+2 22 19.5814	35	+1 58 36.3178	10	+1 34 53.0542
90° 01'	+2 21 38.9167	90° 36'	+1 57 55.6531	91° 11'	+1 34 12.3896
02	+2 20 58.2520	37	+1 57 14.9884	12	+1 33 31.7249
03	+2 20 17.5873	38	+1 56 34.3238	13	+1 32 51.0602
04	+2 19 36.9227	39	+1 55 53.6591	14	+1 32 10.3955
05	+2 18 56.2580	40	+1 55 12.9944	15	+1 31 29.7309

Lambert Projection for Iowa - North

Table II (Cont'd).

1" of Long. = 0.67774455 of θ

Long.	θ	Long.	θ	Long.	θ
91° 16'	+1° 30' 49.0662	91° 51'	+1° 07' 05.8026	92° 26'	+0° 43' 22.5391
17	+1 30 08.4015	52	+1 06 25.1380	27	+0 42 41.8744
18	+1 29 27.7369	53	+1 05 44.4733	28	+0 42 01.2097
19	+1 28 47.0722	54	+1 05 03.8086	29	+0 41 20.5451
20	+1 28 06.4075	55	+1 04 23.1439	30	+0 40 39.8804
91° 21'	+1 27 25.7428	91° 56'	+1 03 42.4793	92° 31'	+0 39 59.2157
22	+1 26 45.0782	57	+1 03 01.8146	32	+0 39 18.5510
23	+1 26 04.4135	58	+1 02 21.1499	33	+0 38 37.8864
24	+1 25 23.7488	59	+1 01 40.4853	34	+0 37 57.2217
25	+1 24 43.0841	92° 00	+1 00 59.8206	35	+0 37 16.5570
91° 26'	+1 24 02.4195	92° 01'	+1 00 19.1559	92° 36'	+0 36 35.8923
27	+1 23 21.7548	02	+0 59 38.4912	37	+0 35 55.2277
28	+1 22 41.0901	03	+0 58 57.8266	38	+0 35 14.5630
29	+1 22 00.4254	04	+0 58 17.1619	39	+0 34 33.8983
30	+1 21 19.7608	05	+0 57 36.4972	40	+0 33 53.2337
91° 31'	+1 20 39.0961	92° 06'	+0 56 55.8325	92° 41'	+0 33 12.5690
32	+1 19 58.4314	07	+0 56 15.1679	42	+0 32 31.9043
33	+1 19 17.7668	08	+0 55 34.5032	43	+0 31 51.2396
34	+1 18 37.1021	09	+0 54 53.8385	44	+0 31 10.5750
35	+1 17 56.4374	10	+0 54 13.1738	45	+0 30 29.9103
91° 36'	+1 17 15.7727	92° 11'	+0 53 32.5092	92° 46'	+0 29 49.2456
37	+1 16 35.1081	12	+0 52 51.8445	47	+0 29 08.5809
38	+1 15 54.4434	13	+0 52 11.1798	48	+0 28 27.9163
39	+1 15 13.7787	14	+0 51 30.5152	49	+0 27 47.2516
40	+1 14 33.1140	15	+0 50 49.8505	50	+0 27 06.5869
91° 41'	+1 13 52.4494	92° 16'	+0 50 09.1858	92° 51'	+0 26 25.9223
42	+1 13 11.7847	17	+0 49 28.5211	52	+0 25 45.2576
43	+1 12 31.1200	18	+0 48 47.8565	53	+0 25 04.5929
44	+1 11 50.4553	19	+0 48 07.1918	54	+0 24 23.9282
45	+1 11 09.7907	20	+0 47 26.5271	55	+0 23 43.2636
91° 46'	+1 10 29.1260	92° 21'	+0 46 45.8624	92° 56'	+0 23 02.5989
47	+1 09 48.4613	22	+0 46 05.1978	57	+0 22 21.9342
48	+1 09 07.7967	23	+0 45 24.5331	58	+0 21 41.2695
49	+1 08 27.1320	24	+0 44 43.8684	59	+0 21 00.6049
50	+1 07 46.4673	25	+0 44 03.2038	93° 00	+0 20 19.9402

Lambert Projection for Iowa - North

Table II (Cont'd).

1" of Long. = 0.67774455 of θ

Long.	θ		Long.	θ		Long.	θ				
93° 01'	+0°	19'	39.2755	93° 36'	-0°	04'	03.9880	94° 11'	-0°	27'	47.2516
02	+0	18	58.6108	37	-0	04	44.6527	12	-0	28	27.9163
03	+0	18	17.9462	38	-0	05	25.3174	13	-0	29	08.5809
04	+0	17	37.2815	39	-0	06	05.9821	14	-0	29	49.2456
05	+0	16	56.6168	40	-0	06	46.6467	15	-0	30	29.9103
93° 06'	+0	16	15.9522	93° 41'	-0	07	27.3114	94° 16'	-0	31	10.5750
07	+0	15	35.2875	42	-0	08	07.9761	17	-0	31	51.2396
08	+0	14	54.6228	43	-0	08	48.6408	18	-0	32	31.9043
09	+0	14	13.9581	44	-0	09	29.3054	19	-0	33	12.5690
10	+0	13	33.2935	45	-0	10	09.9701	20	-0	33	53.2337
93° 11'	+0	12	52.6288	93° 46'	-0	10	50.6348	94° 21'	-0	34	33.8983
12	+0	12	11.9641	47	-0	11	31.2994	22	-0	35	14.5630
13	+0	11	31.2994	48	-0	12	11.9641	23	-0	35	55.2277
14	+0	10	50.6348	49	-0	12	52.6288	24	-0	36	35.8923
15	+0	10	09.9701	50	-0	13	33.2935	25	-0	37	16.5570
93° 16'	+0	09	29.3054	93° 51'	-0	14	13.9581	94° 26'	-0	37	57.2217
17	+0	08	48.6408	52	-0	14	54.6228	27	-0	38	37.8864
18	+0	08	07.9761	53	-0	15	35.2875	28	-0	39	18.5510
19	+0	07	27.3114	54	-0	16	15.9522	29	-0	39	59.2157
20	+0	06	46.6467	55	-0	16	56.6168	30	-0	40	39.8804
93° 21'	+0	06	05.9821	93° 56'	-0	17	37.2815	94° 31'	-0	41	20.5451
22	+0	05	25.3174	57	-0	18	17.9462	32	-0	42	01.2097
23	+0	04	44.6527	58	-0	18	58.6108	33	-0	42	41.8744
24	+0	04	03.9880	59	-0	19	39.2755	34	-0	43	22.5391
25	+0	03	23.3234	94° 00'	-0	20	19.9402	35	-0	44	03.2038
93° 26'	+0	02	42.6587	94° 01'	-0	21	00.6049	94° 36'	-0	44	43.8684
27	+0	02	01.9940	02	-0	21	41.2695	37	-0	45	24.5331
28	+0	01	21.3293	03	-0	22	21.9342	38	-0	46	05.1978
29	+0	00	40.6647	04	-0	23	02.5989	39	-0	46	45.8624
30	0	00	00.0000	05	-0	23	43.2636	40	-0	47	26.5271
93° 31'	-0	00	40.6647	94° 06'	-0	24	23.9282	94° 41'	-0	48	07.1918
32	-0	01	21.3293	07	-0	25	04.5929	42	-0	48	47.8565
33	-0	02	01.9940	08	-0	25	45.2576	43	-0	49	28.5211
34	-0	02	42.6587	09	-0	26	25.9223	44	-0	50	09.1858
35	-0	03	23.3234	10	-0	27	06.5869	45	-0	50	49.8505

Lambert Projection for Iowa - North

Table II (Cont'd).

1" of Long. = 0!67774455 of θ

Long.	θ		Long.	θ		Long.	θ		
94° 46'	-0°	51'	30!5152	95° 21'	-1° 15'	13!7787	95° 56'	-1° 38'	57!0423
47	-0	52	11.1798	22	-1 15	54.4434	57	-1 39	37.7069
48	-0	52	51.8445	23	-1 16	35.1081	58	-1 40	18.3716
48	-0	53	32.5092	24	-1 17	15.7727	59	-1 40	59.0363
50	-0	54	13.1738	25	-1 17	56.4374	96° 00	-1 41	39.7010
94° 51'	-0	54	53.8385	95° 26'	-1 18	37.1021	96° 01'	-1 42	20.3656
52	-0	55	34.5032	27	-1 19	17.7668	02	-1 43	01.0303
53	-0	56	15.1679	28	-1 19	58.4314	03	-1 43	41.6950
54	-0	56	55.8325	29	-1 20	39.0961	04	-1 44	22.3597
55	-0	57	36.4972	30	-1 21	19.7608	05	-1 45	03.0243
94° 56'	-0	58	17.1619	95° 31'	-1 22	00.4254	96° 06'	-1 45	43.6890
57	-0	58	57.8266	32	-1 22	41.0901	07	-1 46	24.3537
58	-0	59	38.4912	33	-1 23	21.7548	08	-1 47	05.0184
59	-1	00	19.1559	34	-1 24	02.4195	09	-1 47	45.6830
95° 00	-1	00	59.8206	35	-1 24	43.0841	10	-1 48	26.3477
95° 01'	-1	01	40.4853	95° 36'	-1 25	23.7488	96° 11'	-1 49	07.0124
02	-1	02	21.1499	37	-1 26	04.4135	12	-1 49	47.6770
03	-1	03	01.8146	38	-1 26	45.0782	13	-1 50	28.3417
04	-1	03	42.4793	39	-1 27	25.7428	14	-1 51	09.0064
05	-1	04	23.1439	40	-1 28	06.4075	15	-1 51	49.6711
95° 06'	-1	05	03.8086	95° 41'	-1 28	47.0722	96° 16'	-1 52	30.3357
07	-1	05	44.4733	42	-1 29	27.7369	17	-1 53	11.0004
08	-1	06	25.1380	43	-1 30	08.4015	18	-1 53	51.6651
09	-1	07	05.8026	44	-1 30	49.0662	19	-1 54	32.3298
10	-1	07	46.4673	45	-1 31	29.7309	20	-1 55	12.9944
95° 11'	-1	08	27.1320	95° 46'	-1 32	10.3955	96° 21'	-1 55	53.6591
12	-1	09	07.7967	47	-1 32	51.0602	22	-1 56	34.3238
13	-1	09	48.4613	48	-1 33	31.7249	23	-1 57	14.9884
14	-1	10	29.1260	49	-1 34	12.3896	24	-1 57	55.6531
15	-1	11	09.7907	50	-1 34	53.0542	25	-1 58	36.3178
95° 16'	-1	11	50.4553	95° 51'	-1 35	33.7189	96° 26'	-1 59	16.9825
17	-1	12	31.1200	52	-1 36	14.3836	27	-1 59	57.6471
18	-1	13	11.7847	53	-1 36	55.0483	28	-2 00	38.3118
19	-1	13	52.4494	54	-1 37	35.7129	29	-2 01	18.9765
20	-1	14	33.1140	55	-1 38	16.3776	30	-2 01	59.6412

Lambert Projection for Iowa - North

Table II (Cont'd).

1" of Long. = 0.67774455 of θ

Long.	θ		
96° 31'	-2° 02'	40.3058	
32	-2 03	20.9705	
33	-2 04	01.6352	
34	-2 04	42.2999	
35	-2 05	22.9645	
96° 36'	-2 06	03.6292	
37	-2 06	44.2939	
38	-2 07	24.9585	
39	-2 08	05.6232	
40	-2 08	46.2879	
96° 41'	-2 09	26.9526	
42	-2 10	07.6172	
43	-2 10	48.2819	
44	-2 11	28.9466	
45	-2 12	09.6113	
96° 46'	-2 12	50.2759	
47	-2 13	30.9406	
48	-2 14	11.6053	
49	-2 14	52.2699	
50	-2 15	32.9346	
96° 51'	-2 16	13.5993	
52	-2 16	54.2640	
53	-2 17	34.9286	
54	-2 18	15.5933	
55	-2 18	56.2580	
96° 56'	-2 19	36.9227	
57	-2 20	17.5873	
58	-2 20	58.2520	
59	-2 21	38.9167	
97° 00	-2 22	19.5814	

Lambert Projection for Iowa - South

Table I.

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
40° 00	24,374,096.67	0	101.20550	+720.1	1.0001658
01'	24,368,024.34	6,072.33	101.20500	+694.2	1.0001598
02	24,361,952.04	12,144.63	101.20483	+668.6	1.0001539
03	24,355,879.75	18,216.92	101.20450	+643.3	1.0001481
04	24,349,807.48	24,289.19	101.20433	+618.5	1.0001424
05	24,343,735.22	30,361.45	101.20400	+594.0	1.0001368
40° 06'	24,337,662.98	36,433.69	101.20367	+569.8	1.0001312
07	24,331,590.76	42,505.91	101.20350	+546.0	1.0001257
08	24,325,518.55	48,578.12	101.20317	+522.6	1.0001203
09	24,319,446.36	54,650.31	101.20300	+499.5	1.0001150
10	24,313,374.18	60,722.49	101.20267	+476.8	1.0001098
40° 11'	24,307,302.02	66,794.65	101.20250	+454.4	1.0001046
12	24,301,229.87	72,866.80	101.20233	+432.4	1.0000996
13	24,295,157.73	78,938.94	101.20217	+410.8	1.0000946
14	24,289,085.60	85,011.07	101.20183	+389.5	1.0000897
15	24,283,013.49	91,083.18	101.20183	+368.6	1.0000849
40° 16'	24,276,941.38	97,155.29	101.20150	+348.1	1.0000802
17	24,270,869.29	103,227.38	101.20133	+327.9	1.0000755
18	24,264,797.21	109,299.46	101.20133	+308.1	1.0000709
19	24,258,725.13	115,371.54	101.20100	+288.6	1.0000665
20	24,252,653.07	121,443.60	101.20083	+269.5	1.0000621
40° 21'	24,246,581.02	127,515.65	101.20083	+250.8	1.0000577
22	24,240,508.97	133,587.70	101.20067	+232.4	1.0000535
23	24,234,436.93	139,659.74	101.20050	+214.3	1.0000493
24	24,228,364.90	145,731.77	101.20050	+196.7	1.0000453
25	24,222,292.87	151,803.80	101.20017	+179.4	1.0000413
40° 26'	24,216,220.86	157,875.81	101.20033	+162.4	1.0000374
27	24,210,148.84	163,947.83	101.20017	+145.9	1.0000336
28	24,204,076.83	170,019.84	101.20000	+129.6	1.0000298
29	24,198,004.83	176,091.84	101.20000	+113.8	1.0000262
30	24,191,932.83	182,163.84	101.19983	+ 98.3	1.0000226
40° 31'	24,185,860.84	188,235.83	101.20000	+ 83.2	1.0000192
32	24,179,788.84	194,307.83	101.19983	+ 68.4	1.0000157
33	24,173,716.85	200,379.82	101.19967	+ 54.0	1.0000124
34	24,167,644.87	206,451.80	101.19983	+ 39.9	1.0000092
35	24,161,572.88	212,523.79	101.19967	+ 26.3	1.0000061

Lambert Projection for Iowa - South

Table I (Cont'd).

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
40° 36'	24,155,500.90	218,595.77	101.19983	+ 12.9	1.0000030
37	24,149,428.91	224,667.76	101.19967	0.0	1.0000000
38	24,143,356.93	230,739.74	101.19983	- 12.6	0.9999971
39	24,137,284.94	236,811.73	101.19967	- 24.8	0.9999943
40	24,131,212.96	242,883.71	101.19983	- 36.7	0.9999915
40° 41'	24,125,140.97	248,955.70	101.19983	- 48.2	0.9999889
42	24,119,068.98	255,027.69	101.19983	- 59.4	0.9999863
43	24,112,996.99	261,099.68	101.19983	- 70.1	0.9999839
44	24,106,925.00	267,171.67	101.20000	- 80.6	0.9999814
45	24,100,853.00	273,243.67	101.20000	- 90.6	0.9999791
40° 46'	24,094,781.00	279,315.67	101.20017	-100.3	0.9999769
47	24,088,708.99	285,387.68	101.20017	-109.6	0.9999748
48	24,082,636.98	291,459.69	101.20033	-118.6	0.9999727
49	24,076,564.96	297,531.71	101.20033	-127.2	0.9999707
50	24,070,492.94	303,603.73	101.20050	-135.4	0.9999688
40° 51'	24,064,420.91	309,675.76	101.20067	-143.3	0.9999670
52	24,058,348.87	315,747.80	101.20067	-150.8	0.9999653
53	24,052,276.83	321,819.84	101.20100	-157.9	0.9999636
54	24,046,204.77	327,891.90	101.20100	-164.6	0.9999621
55	24,040,132.71	333,963.96	101.20117	-171.0	0.9999606
40° 56'	24,034,060.64	340,036.03	101.20133	-177.1	0.9999592
57	24,027,988.56	346,108.11	101.20150	-182.8	0.9999579
58	24,021,916.47	352,180.20	101.20167	-188.1	0.9999567
59	24,015,844.37	358,252.30	101.20183	-193.0	0.9999556
41° 00	24,009,772.26	364,324.41	101.20200	-197.6	0.9999545
41° 01'	24,003,700.14	370,396.53	101.20233	-201.8	0.9999535
02	23,997,628.00	376,468.67	101.20233	-205.7	0.9999526
03	23,991,555.86	382,540.81	101.20267	-209.2	0.9999518
04	23,985,483.70	388,612.97	101.20300	-212.3	0.9999511
05	23,979,411.52	394,685.15	101.20317	-215.0	0.9999505
41° 06'	23,973,339.33	400,757.34	101.20333	-217.4	0.9999499
07	23,967,267.13	406,829.54	101.20367	-219.5	0.9999495
08	23,961,194.91	412,901.76	101.20400	-221.2	0.9999491
09	23,955,122.67	418,974.00	101.20417	-222.5	0.9999488
10	23,949,050.42	425,046.25	101.20450	-223.4	0.9999486

Lambert Projection for Iowa - South

Table I (Cont'd).

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
41° 11'	23,942,978.15	431,118.52	101.20467	-223.9	0.9999484
12	23,936,905.87	437,190.80	101.20500	-224.2	0.9999484
13	23,930,833.57	443,263.10	101.20533	-224.0	0.9999484
14	23,924,761.25	449,335.42	101.20567	-223.5	0.9999485
15	23,918,688.91	455,407.76	101.20600	-222.6	0.9999487
41° 16'	23,912,616.55	461,480.12	101.20633	-221.3	0.9999490
17	23,906,544.17	467,552.50	101.20667	-219.7	0.9999494
18	23,900,471.77	473,624.90	101.20700	-217.8	0.9999499
19	23,894,399.35	479,697.32	101.20733	-215.4	0.9999504
20	23,888,326.91	485,769.76	101.20783	-212.6	0.9999510
41° 21'	23,882,254.44	491,842.23	101.20800	-209.5	0.9999518
22	23,876,181.96	497,914.71	101.20850	-206.1	0.9999525
23	23,870,109.45	503,987.22	101.20883	-202.3	0.9999534
24	23,864,036.92	510,059.75	101.20933	-198.1	0.9999544
25	23,857,964.36	516,132.31	101.20967	-193.5	0.9999554
41° 26'	23,851,891.78	522,204.89	101.21017	-188.6	0.9999566
27	23,845,819.17	528,277.50	101.21050	-183.3	0.9999578
28	23,839,746.54	534,350.13	101.21100	-177.6	0.9999591
29	23,833,673.88	540,422.79	101.21133	-171.6	0.9999605
30	23,827,601.20	546,495.47	101.21183	-165.2	0.9999620
41° 31'	23,821,528.49	552,568.18	101.21233	-158.4	0.9999635
32	23,815,455.75	558,640.92	101.21283	-151.3	0.9999652
33	23,809,382.98	564,713.69	101.21317	-143.8	0.9999669
34	23,803,310.19	570,786.48	101.21383	-135.9	0.9999687
35	23,797,237.36	576,859.31	101.21417	-127.6	0.9999706
41° 36'	23,791,164.51	582,932.16	101.21483	-119.0	0.9999726
37	23,785,091.62	589,005.05	101.21517	-110.0	0.9999747
38	23,779,018.71	595,077.96	101.21583	-100.7	0.9999768
39	23,772,945.76	601,150.91	101.21617	-91.0	0.9999790
40	23,766,872.79	607,223.88	101.21683	-80.9	0.9999814
41° 41'	23,760,799.78	613,296.89	101.21750	-70.5	0.9999838
42	23,754,726.73	619,369.94	101.21783	-59.7	0.9999863
43	23,748,653.66	625,443.01	101.21850	-48.5	0.9999888
44	23,742,580.55	631,516.12	101.21917	-36.9	0.9999915
45	23,736,507.40	637,589.27	101.21967	-25.0	0.9999942

Table I (Cont'd).

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
41° 46'	23,730,434.22	643,662.45	101.22017	- 12.7	0.9999971
47	23,724,361.01	649,735.66	101.22083	0.0	1.0000000
48	23,718,287.76	655,808.91	101.22150	+ 13.0	1.0000030
49	23,712,214.47	661,882.20	101.22200	+ 26.4	1.0000061
50	23,706,141.15	667,955.52	101.22267	+ 40.2	1.0000093
41° 51'	23,700,067.79	674,028.88	101.22335	+ 54.4	1.0000125
52	23,693,994.39	680,102.28	101.22400	+ 68.9	1.0000159
53	23,687,920.95	686,175.72	101.22467	+ 83.8	1.0000193
54	23,681,847.47	692,249.20	101.22517	+ 99.1	1.0000228
55	23,675,773.96	698,322.71	101.22600	+114.7	1.0000264
41° 56'	23,669,700.40	704,396.27	101.22667	+130.7	1.0000301
57	23,663,626.80	710,469.87	101.22717	+147.1	1.0000339
58	23,657,553.17	716,543.50	101.22800	+163.8	1.0000377
59	23,651,479.49	722,617.18	101.22867	+180.9	1.0000417
42° 00	23,645,405.77	728,690.90	101.22950	+198.4	1.0000457
42° 01'	23,639,332.00	734,764.67	101.23000	+216.2	1.0000498
02	23,633,258.20	740,838.47	101.23083	+234.4	1.0000540
03	23,627,184.35	746,912.32	101.23167	+253.0	1.0000583
04	23,621,110.45	752,986.22	101.23233	+272.0	1.0000626
05	23,615,036.51	759,060.16	101.23300	+291.3	1.0000671
42° 06'	23,608,962.53	765,134.14	101.23383	+311.0	1.0000716
07	23,602,888.50	771,208.17	101.23467	+331.1	1.0000762
08	23,596,814.42	777,282.25	101.23533	+351.5	1.0000809
09	23,590,740.30	783,356.37	101.23617	+372.3	1.0000857
10	23,584,666.13	789,430.54	101.23700	+393.5	1.0000906
42° 11'	23,578,591.91	795,504.76	101.23783	+415.1	1.0000956
12	23,572,517.64	801,579.03	101.23850	+437.0	1.0001006
13	23,566,443.33	807,653.34	101.23950	+459.3	1.0001058
14	23,560,368.96	813,727.71	101.24017	+482.0	1.0001110
15	23,554,294.55	819,802.12	101.24117	+505.1	1.0001163
42° 16'	23,548,220.08	825,876.59	101.24183	+528.5	1.0001217
17	23,542,145.57	831,951.10	101.24283	+552.3	1.0001272
18	23,536,071.00	838,025.67	101.24367	+576.4	1.0001327
19	23,529,996.38	844,100.29	101.24450	+601.0	1.0001384
20	23,523,921.71	850,174.96	101.24533	+625.9	1.0001441

Lambert Projection for Iowa - South

Table I (Cont'd).

Latitude	R feet	Y' Y value on central meridian feet	Tabular difference for 1 sec. of lat. feet	Scale in units of 7th place of logs	Scale expressed as a ratio
42° 21'	23,517,846.99	856,249.68	101.24633	+651.2	1.0001499
22	23,511,772.21	862,324.46	101.24717	+676.8	1.0001558
23	23,505,697.38	868,399.29	101.24817	+702.8	1.0001618
24	23,499,622.49	874,474.18	101.24900	+729.2	1.0001679
25	23,493,547.55	880,549.12	101.25000	+756.0	1.0001741
42° 26'	23,487,472.55	886,624.12	101.25083	+783.2	1.0001803
27	23,481,397.50	892,699.17	101.25183	+810.7	1.0001867
28	23,475,322.39	898,774.28	101.25283	+838.6	1.0001931
29	23,469,247.22	904,849.45	101.25383	+866.9	1.0001996
30	23,463,171.99	910,924.68	101.25467	+895.5	1.0002062
42° 31'	23,457,096.71	916,999.96	101.25567	+924.5	1.0002129
32	23,451,021.37	923,075.30	101.25667	+953.9	1.0002196
33	23,444,945.97	929,150.70	101.25767	+983.7	1.0002265
34	23,438,870.51	935,226.16	101.25883	+1013.8	1.0002334
35	23,432,794.98	941,301.69	101.25967	+1044.3	1.0002405
42° 36'	23,426,719.40	947,377.27	101.26067	+1075.2	1.0002476
37	23,420,643.76	953,452.91	101.26183	+1106.5	1.0002548
38	23,414,568.05	959,528.62	101.26283	+1138.1	1.0002621
39	23,408,492.28	965,604.39	101.26383	+1170.1	1.0002694
40	23,402,416.45	971,680.22		+1202.5	1.0002769

Lambert Projection for Iowa - South

Table II (Cont'd).

1" of Long. = 0.65870102 of θ

Long.	θ	Long.	θ	Long.	θ
91° 16'	+1° 28' 15.9562	91° 51'	+1° 05' 12.6841	92° 26'	+0° 42' 09.4119
17	+1 27 36.4342	52	+1 04 33.1620	27	+0 41 29.8899
18	+1 26 56.9121	53	+1 03 53.6399	28	+0 40 50.3678
19	+1 26 17.3900	54	+1 03 14.1179	29	+0 40 10.8457
20	+1 25 37.8680	55	+1 02 34.5958	30	+0 39 31.3237
91° 21'	+1 24 58.3459	91° 56'	+1 01 55.0738	92° 31'	+0 38 51.8016
22	+1 24 18.8238	57	+1 01 15.5517	32	+0 38 12.2796
23	+1 23 39.3018	58	+1 00 36.0296	33	+0 37 32.7575
24	+1 22 59.7797	59	+0 59 56.5076	34	+0 36 53.2354
25	+1 22 20.2577	92° 00'	+0 59 16.9855	35	+0 36 13.7134
91° 26'	+1 21 40.7356	92° 01'	+0 58 37.4635	92° 36'	+0 35 34.1913
27	+1 21 01.2135	02	+0 57 57.9414	37	+0 34 54.6692
28	+1 20 21.6915	03	+0 57 18.4193	38	+0 34 15.1472
29	+1 19 42.1694	04	+0 56 38.8973	39	+0 33 35.6251
30	+1 19 02.6474	05	+0 55 59.3752	40	+0 32 56.1031
91° 31'	+1 18 23.1253	92° 06'	+0 55 19.8531	92° 41'	+0 32 16.5810
32	+1 17 43.6032	07	+0 54 40.3311	42	+0 31 37.0589
33	+1 17 04.0812	08	+0 54 00.8090	43	+0 30 57.5369
34	+1 16 24.5591	09	+0 53 21.2870	44	+0 30 18.0148
35	+1 15 45.0370	10	+0 52 41.7649	45	+0 29 38.4928
91° 36'	+1 15 05.5150	92° 11'	+0 52 02.2428	92° 46'	+0 28 58.9707
37	+1 14 25.9929	12	+0 51 22.7208	47	+0 28 19.4486
38	+1 13 46.4709	13	+0 50 43.1987	48	+0 27 39.9266
39	+1 13 06.9488	14	+0 50 03.6767	49	+0 27 00.4045
40	+1 12 27.4267	15	+0 49 24.1546	50	+0 26 20.8825
91° 41'	+1 11 47.9047	92° 16'	+0 48 44.6325	92° 51'	+0 25 41.3604
42	+1 11 08.3826	17	+0 48 05.1105	52	+0 25 01.8383
43	+1 10 28.8606	18	+0 47 25.5884	53	+0 24 22.3163
44	+1 09 49.3385	19	+0 46 46.0664	54	+0 23 42.7942
45	+1 09 09.8164	20	+0 46 06.5443	55	+0 23 03.2721
91° 46'	+1 08 30.2944	92° 21'	+0 45 27.0222	92° 56'	+0 22 23.7501
47	+1 07 50.7723	22	+0 44 47.5002	57	+0 21 44.2280
48	+1 07 11.2503	23	+0 44 07.9781	58	+0 21 04.7060
49	+1 06 31.7282	24	+0 43 28.4560	59	+0 20 25.1839
50	+1 05 52.2061	25	+0 42 48.9340	93° 00'	+0 19 45.6618

Table II (Cont'd).

1" of Long. = 0.65870102 of \ominus

Long.	\ominus			Long.	\ominus			Long.	\ominus		
93° 01'	+0° 19'	06.1398		93° 36'	-0° 03'	57.1324	94° 11'	-0° 27'	00.4045		
02	+0 18	26.6177		37	-0 04	36.6544	12	-0 27	39.9266		
03	+0 17	47.0957		38	-0 05	16.1765	13	-0 28	19.4486		
04	+0 17	07.5736		39	-0 05	55.6986	14	-0 28	58.9707		
05	+0 16	28.0515		40	-0 06	35.2206	15	-0 29	38.4928		
93° 06'	+0 15	48.5295		93° 41'	-0 07	14.7427	94° 16'	-0 30	18.0148		
07	+0 15	09.0074		42	-0 07	54.2647	17	-0 30	57.5369		
08	+0 14	29.4853		43	-0 08	33.7868	18	-0 31	37.0589		
09	+0 13	49.9633		44	-0 09	13.3089	19	-0 32	16.5810		
10	+0 13	10.4412		45	-0 09	52.8309	20	-0 32	56.1031		
93° 11'	+0 12	30.9192		93° 46'	-0 10	32.3530	94° 21'	-0 33	35.6251		
12	+0 11	51.3971		47	-0 11	11.8750	22	-0 34	15.1472		
13	+0 11	11.8750		48	-0 11	51.3971	23	-0 34	54.6692		
14	+0 10	32.3530		49	-0 12	30.9192	24	-0 35	34.1913		
15	+0 09	52.8309		50	-0 13	10.4412	25	-0 36	13.7134		
93° 16'	+0 09	13.3089		93° 51'	-0 13	49.9633	94° 26'	-0 36	53.2354		
17	+0 08	33.7868		52	-0 14	29.4853	27	-0 37	32.7575		
18	+0 07	54.2647		53	-0 15	09.0074	28	-0 38	12.2796		
19	+0 07	14.7427		54	-0 15	48.5295	29	-0 38	51.8016		
20	+0 06	35.2206		55	-0 16	28.0515	30	-0 39	31.3237		
93° 21'	+0 05	55.6986		93° 56'	-0 17	07.5736	94° 31'	-0 40	10.8457		
22	+0 05	16.1765		57	-0 17	47.0957	32	-0 40	50.3678		
23	+0 04	36.6544		58	-0 18	26.6177	33	-0 41	29.8899		
24	+0 03	57.1324		59	-0 19	06.1398	34	-0 42	09.4119		
25	+0 03	17.6103		94° 00'	-0 19	45.6618	35	-0 42	48.9340		
93° 26'	+0 02	38.0882		94° 01'	-0 20	25.1839	94° 36'	-0 43	28.4560		
27	+0 01	58.5662		02	-0 21	04.7060	37	-0 44	07.9781		
28	+0 01	19.0441		03	-0 21	44.2280	38	-0 44	47.5002		
29	+0 00	39.5221		04	-0 22	23.7501	39	-0 45	27.0222		
30	0 00	00.0000		05	-0 23	03.2721	40	-0 46	06.5443		
93° 31'	-0 00	39.5221		94° 06'	-0 23	42.7942	94° 41'	-0 46	46.0664		
32	-0 01	19.0441		07	-0 24	22.3163	42	-0 47	25.5884		
33	-0 01	58.5662		08	-0 25	01.8383	43	-0 48	05.1105		
34	-0 02	38.0882		09	-0 25	41.3604	44	-0 48	44.6325		
35	-0 03	17.6103		10	-0 26	20.8825	45	-0 49	24.1546		

Lambert Projection for Iowa - South

Table II (Cont'd).

1" of Long. = 0.65870102 of θ

Long.	θ		Long.	θ		Long.	θ				
94° 46'	-0°	50'	03.6767	95° 21'	-1°	13'	06.9488	95° 56'	-1°	36'	10.2209
47	-0°	50	43.1987	22	-1	13	46.4709	57	-1	36	49.7430
48	-0°	51	22.7208	23	-1	14	25.9929	58	-1	37	29.2651
49	-0°	52	02.2428	24	-1	15	05.5150	59	-1	38	08.7871
50	-0°	52	41.7649	25	-1	15	45.0370	96° 00	-1	38	48.3092
94° 51'	-0°	53	21.2870	95° 26'	-1°	16	24.5591	96° 01'	-1°	39	27.8313
52	-0°	54	00.8090	27	-1	17	04.0812	02	-1	40	07.3533
53	-0°	54	40.3311	28	-1	17	43.6032	03	-1	40	46.8754
54	-0°	55	19.8531	29	-1	18	23.1253	04	-1	41	26.3974
55	-0°	55	59.3752	30	-1	19	02.6474	05	-1	42	05.9195
94° 56'	-0°	56	38.8973	95° 31'	-1°	19	42.1694	96° 06'	-1°	42	45.4416
57	-0°	57	18.4193	32	-1	20	21.6915	07	-1	43	24.9636
58	-0°	57	57.9414	33	-1	21	01.2135	08	-1	44	04.4857
59	-0°	58	37.4635	34	-1	21	40.7356	09	-1	44	44.0077
95° 00	-0°	59	16.9855	35	-1	22	20.2577	10	-1	45	23.5298
95° 01'	-0°	59	56.5076	95° 36'	-1°	22	59.7797	96° 11'	-1°	46	03.0519
02	-1°	00	36.0296	37	-1	23	39.3018	12	-1	46	42.5739
03	-1°	01	15.5517	38	-1	24	18.8238	13	-1	47	22.0960
04	-1°	01	55.0738	39	-1	24	58.3459	14	-1	48	01.6180
05	-1°	02	34.5958	40	-1	25	37.8680	15	-1	48	41.1401
95° 06'	-1°	03	14.1179	95° 41'	-1°	26	17.3900	96° 16'	-1°	49	20.6622
07	-1°	03	53.6399	42	-1	26	56.9121	17	-1	50	00.1842
08	-1°	04	33.1620	43	-1	27	36.4342	18	-1	50	39.7063
09	-1°	05	12.6841	44	-1	28	15.9562	19	-1	51	19.2284
10	-1°	05	52.2061	45	-1	28	55.4783	20	-1	51	58.7504
95° 11'	-1°	06	31.7282	95° 46'	-1°	29	35.0003	96° 21'	-1°	52	38.2725
12	-1°	07	11.2503	47	-1	30	14.5224	22	-1	53	17.7945
13	-1°	07	50.7723	48	-1	30	54.0445	23	-1	53	57.3166
14	-1°	08	30.2944	49	-1	31	33.5665	24	-1	54	36.8387
15	-1°	09	09.8164	50	-1	32	13.0886	25	-1	55	16.3607
95° 16'	-1°	09	49.3385	95° 51'	-1°	32	52.6106	96° 26'	-1°	55	55.8828
17	-1°	10	28.8606	52	-1	33	32.1327	27	-1	56	35.4048
18	-1°	11	08.3826	53	-1	34	11.6548	28	-1	57	14.9269
19	-1°	11	47.9047	54	-1	34	51.1768	29	-1	57	54.4490
20	-1°	12	27.4267	55	-1	35	30.6989	30	-1	58	33.9710

Lambert Projection for Iowa -- South

Table II (Cont'd).

1" of Long. = 0.65870102 of θ

Long.	θ
96° 31'	-1° 59' 13.4931
32	-1 59 53.0152
33	-2 00 32.5372
34	-2 01 12.0593
35	-2 01 51.5813
96° 36'	-2 02 31.1034
37	-2 03 10.6255
38	-2 03 50.1475
39	-2 04 29.6696
40	-2 05 09.1916
96° 41'	-2 05 48.7137
42	-2 06 28.2358
43	-2 07 07.7578
44	-2 07 47.2799
45	-2 08 26.8019
96° 46'	-2 09 06.3240
47	-2 09 45.8461
48	-2 10 25.3681
49	-2 11 04.8902
50	-2 11 44.4123
96° 51'	-2 12 23.9343
52	-2 13 03.4564
53	-2 13 42.9784
54	-2 14 22.5005
55	-2 15 02.0226
96° 56'	-2 15 41.5446
57	-2 16 21.0667
58	-2 17 00.5887
59	-2 17 40.1108
97° 00	-2 18 19.6329

CORRECTIONS TO NATURAL SCALE RATIOS*
(in units of the 7th decimal place)

For Lambert Projection				For Lambert or transverse Mercator Projection			
<u>$\Delta\phi'$ as argument</u>							
<u>$\Delta\phi'$</u>	<u>Corr'n</u> (Plus)	<u>$\Delta\phi'$</u>	<u>Corr'n</u> (Plus)	<u>Δy</u> or	<u>Δx</u>	<u>Corr'n</u> (Plus)	
1	0	31	34	10,000		0	
2	0	32	36	20,000		0	
3	0	33	38	30,000		1	
4	1	34	40	40,000		2	
5	1	35	43	50,000		2	
6	1	36	45	60,000		3	
7	2	37	48	70,000		5	
8	2	38	51	80,000		6	
9	3	39	53	90,000		8	
10	4	40	56	100,000		10	
11	4	41	59	110,000		11	
12	5	42	62	120,000		14	
13	6	43	65	130,000		16	
14	7	44	68	140,000		19	
15	8	45	71	150,000		21	
16	9	46	74	160,000		24	
17	10	47	77	170,000		27	
18	11	48	81	180,000		31	
19	13	49	84	190,000		34	
20	14	50	88	200,000		38	
21	15	51	91	210,000		42	
22	17	52	95	220,000		46	
23	19	53	98	230,000		50	
24	20	54	102	240,000		55	
25	22	55	106	250,000		59	
26	24	56	110	260,000		64	
27	26	57	114	270,000		69	
28	27	58	118	280,000		74	
29	29	59	122	290,000		80	
30	32	60	126	300,000		86	
				310,000		91	
				320,000		97	
				330,000		103	
				340,000		110	
				350,000		116	

$\Delta\phi'$ is the difference in
latitude in minutes
of the ends of the line.

*Scale ratio interpolated for mean latitude or mean x' of the ends of a line and corrected by the above table is a true mean value accurate to within one in the seventh decimal place.