

QB
275
-435
no. 274
1952

U. S. Department of Commerce

Charles Sawyer, Secretary

Coast and Geodetic Survey

Robert F. A. Studds, Director

Special Publication No. 274

**PLANE COORDINATE PROJECTION TABLES
MASSACHUSETTS**



LIBRARY
MAY 22 1992
N.O.A.A.
U.S. Dept. of Commerce

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1952

National Oceanic and Atmospheric Administration

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages

Faded or light ink

Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or www.reference@nodc.noaa.gov.

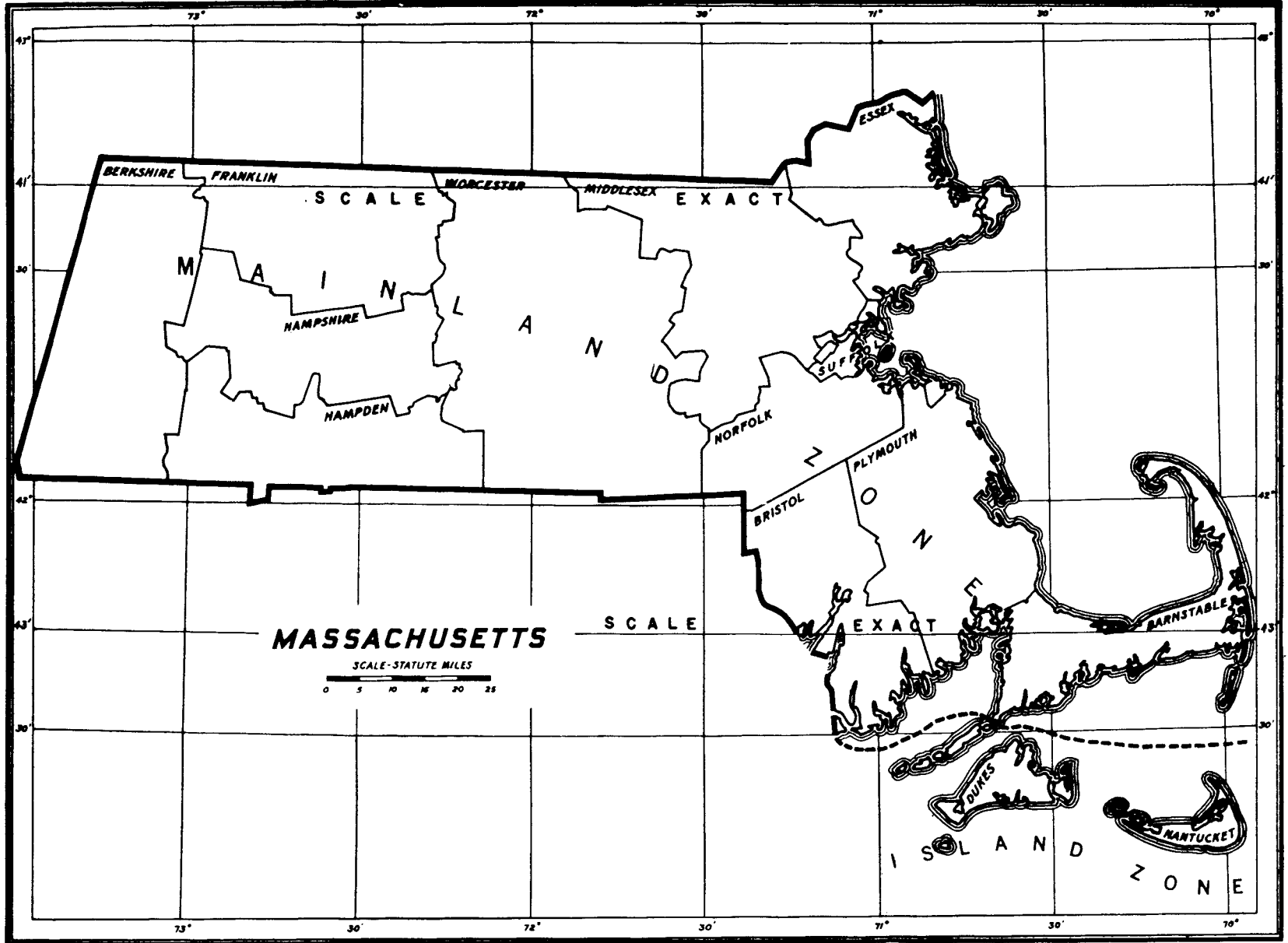
LASON

Imaging Contractor

12200 Kiln Court

Beltsville, MD 20704-1387

January 1, 2006



STATE PLANE-COORDINATE ZONES

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.

$$x' = x - C$$

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

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

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

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

where

R, R_b , 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)

$X = R \sin \theta + C$
 $C = 600,000.00$

$Y = R_b - R \cos \theta$
 $R_b = 23,549,477.32$

State-Zone *Mass - Mainland*
Grid Az. = *Geod. Az. - \theta*

Station	Latitude	R	sin θ	X
	Longitude	θ	cos θ	Y
1 Pond, 1934	41 40 15.808	23,304,946.92	+0.01230 74278	886,823.95
	70 27 00.716	+0 42 18.6533	0.99992 42607	246,295.50
	Grid azimuth to azimuth mark			339 23 29"
2 Bald Peak, 1836, r.1938	42 06 06.860	23,147,948.59	-0.02266 15283	75,432.11
	73 25 59.173	-1 17 54.6759	0.99974 31946	407,473.25
	Grid azimuth to azimuth mark			9 33 11"
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 Mass. - Mainland $l = 0.6717286561$

Station Pond, 1934

C	- 600,000.00	R _b	23,549,477.32
X	886,823.95	Y	- 246,295.50
X' = X - C	+ 286,823.95	R _b - Y	23,303,181.82
tan θ = X' ÷ (R _b - Y)	+ 0.01230 83600	θ	+ 2538.6533
θ	+ 0° 42' 18.6533"	Δλ = θ ÷ l	+ 3779.284
cos θ	0.99992 42607	Δλ	+ 1° 02' 59.284"
R = (R _b - Y) ÷ cos θ	23,304,946.92	Central Meridian	71° 30' 00.000"
φ	41° 40' 15.808"	λ = C.M. - Δλ	70° 27' 00.716"

Station Bald Peak, 1836, r. 1938

C	- 600,000.00	R _b	23,549,477.32
X	75,432.11	Y	- 407,473.25
X' = X - C	- 524,567.89	R _b - Y	23,142,004.07
tan θ = X' ÷ (R _b - Y)	- 0.02266 73493	θ	- 4674.6759
θ	- 1° 17' 54.6759"	Δλ = θ ÷ l	- 6959.173
cos θ	0.99974 31946	Δλ	- 1° 55' 59.173"
R = (R _b - Y) ÷ cos θ	23,147,948.59	Central Meridian	71° 30' 00.000"
φ	42° 06' 06.860"	λ = C.M. - Δλ	73° 25' 59.173"

Station

C	-	R _b	
X		Y	-
X' = X - C		R _b - Y	
tan θ = X' ÷ (R _b - Y)		θ	"
θ	"	Δλ = θ ÷ l	"
cos θ		Δλ	"
R = (R _b - Y) ÷ cos θ		Central Meridian	"
φ		λ = C.M. - Δλ	"

Station

C	-	R _b	
X		Y	-
X' = X - C		R _b - Y	
tan θ = X' ÷ (R _b - Y)		θ	"
θ	"	Δλ = θ ÷ l	"
cos θ		Δλ	"
R = (R _b - Y) ÷ cos θ		Central Meridian	"
φ		λ = C.M. - Δλ	"

Constants for Massachusetts

Constant	Mainland zone	Island zone
C	600,000.00 ft.	200,000.00 ft.
Central Meridian	71° 30' 00" 000	70° 30' 00" 000
R_b	23,549,477.32 ft.	23,924,398.02 ft.
y_0	437,502.18 ft.	139,719.58 ft.
l	0.67172 86561	0.66109 53994
$\frac{1}{2 \rho_0^2 \sin 1''}$	2.357×10^{-10}	2.357×10^{-10}
$\log \frac{1}{2 \rho_0^2 \sin 1''}$	0.372 3226 -10	0.372 4059 -10
$\log l$	9.82719 38758 -10	9.82026 41349 -10
$\log K$	7.59994 28232	7.60319 40087

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE I

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
41° 00'	23,549,477.32	0	101.22483	+789.8	1.0001819
01	23,543,403.83	6,073.49	101.22450	+763.9	1.0001759
02	23,537,330.36	12,146.96	101.22417	+738.3	1.0001700
03	23,531,256.91	18,220.41	101.22400	+713.1	1.0001642
04	23,525,183.47	24,293.85	101.22367	+688.2	1.0001585
05	23,519,110.05	30,367.27	101.22333	+663.7	1.0001528
41° 06'	23,513,036.65	36,440.67	101.22317	+639.6	1.0001473
07	23,506,963.26	42,514.06	101.22283	+615.8	1.0001418
08	23,500,889.89	48,587.43	101.22267	+592.4	1.0001364
09	23,494,816.53	54,660.79	101.22233	+569.3	1.0001311
10	23,488,743.19	60,734.13	101.22217	+546.6	1.0001259
41° 11'	23,482,669.86	66,807.46	101.22183	+524.3	1.0001207
12	23,476,596.55	72,880.77	101.22183	+502.3	1.0001157
13	23,470,523.24	78,954.08	101.22150	+480.7	1.0001107
14	23,464,449.95	85,027.37	101.22133	+459.4	1.0001058
15	23,458,376.67	91,100.65	101.22100	+438.5	1.0001010
41° 16'	23,452,303.41	97,173.91	101.22100	+418.0	1.0000962
17	23,446,230.15	103,247.17	101.22083	+397.8	1.0000916
18	23,440,156.90	109,320.42	101.22067	+378.0	1.0000870
19	23,434,083.66	115,393.66	101.22050	+358.5	1.0000825
20	23,428,010.43	121,466.89	101.22033	+339.4	1.0000781
41° 21'	23,421,937.21	127,540.11	101.22017	+320.7	1.0000738
22	23,415,864.00	133,613.32	101.22000	+302.3	1.0000696
23	23,409,790.80	139,686.52	101.22000	+284.3	1.0000655
24	23,403,717.60	145,759.72	101.21983	+266.6	1.0000614
25	23,397,644.41	151,832.91	101.21983	+249.3	1.0000574
41° 26'	23,391,571.22	157,906.10	101.21967	+232.4	1.0000535
27	23,385,498.04	163,979.28	101.21950	+215.8	1.0000497
28	23,379,424.87	170,052.45	101.21950	+199.6	1.0000460
29	23,373,351.70	176,125.62	101.21950	+183.8	1.0000423
30	23,367,278.53	182,198.79	101.21933	+168.3	1.0000388
41° 31'	23,361,205.37	188,271.95	101.21917	+153.2	1.0000353
32	23,355,132.22	194,345.10	101.21933	+138.4	1.0000319
33	23,349,059.06	200,418.26	101.21933	+124.0	1.0000286
34	23,342,985.90	206,491.42	101.21917	+110.0	1.0000253
35	23,336,912.75	212,564.57	101.21917	+96.3	1.0000222

LAMBERT PROJECTION FOR MASSACHUSETTS

 MAINLAND ZONE
 TABLE I (Cont'd)

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
41° 36'	23,330,839.60	218,637.72	101.21917	+ 83.0	1.0000191
37	23,324,766.45	224,710.87	101.21917	+ 70.1	1.0000161
38	23,318,693.30	230,784.02	101.21933	+ 57.5	1.0000132
39	23,312,620.14	236,857.18	101.21917	+ 45.3	1.0000104
40	23,306,546.99	242,930.33	101.21917	+ 33.4	1.0000077
41° 41'	23,300,473.84	249,003.48	101.21933	+ 21.9	1.0000050
42	23,294,400.68	255,076.64	101.21933	+ 10.8	1.0000025
43	23,288,327.52	261,149.80	101.21933	0.0	1.0000000
44	23,282,254.36	267,222.96	101.21950	- 10.4	0.9999976
45	23,276,181.19	273,296.13	101.21950	- 20.4	0.9999953
41° 46'	23,270,108.02	279,369.30	101.21950	- 30.1	0.9999931
47	23,264,034.85	285,442.47	101.21967	- 39.4	0.9999909
48	23,257,961.67	291,515.65	101.21983	- 48.4	0.9999889
49	23,251,888.48	297,588.84	101.21983	- 57.0	0.9999869
50	23,245,815.29	303,662.03	101.22000	- 65.2	0.9999850
41° 51'	23,239,742.09	309,735.23	101.22000	- 73.1	0.9999832
52	23,233,668.89	315,808.43	101.22017	- 80.6	0.9999814
53	23,227,595.68	321,881.64	101.22033	- 87.7	0.9999798
54	23,221,522.46	327,954.86	101.22050	- 94.5	0.9999782
55	23,215,449.23	334,028.09	101.22067	-100.9	0.9999768
41° 56'	23,209,375.99	340,101.33	101.22083	-107.0	0.9999754
57	23,203,302.74	346,174.58	101.22100	-112.7	0.9999740
58	23,197,229.48	352,247.84	101.22117	-118.0	0.9999728
59	23,191,156.21	358,321.11	101.22133	-122.9	0.9999717
42° 00	23,185,082.93	364,394.39	101.22150	-127.5	0.9999706
42° 01'	23,179,009.64	370,467.68	101.22183	-131.7	0.9999697
02	23,172,936.33	376,540.99	101.22200	-135.6	0.9999688
03	23,166,863.01	382,614.31	101.22217	-139.1	0.9999680
04	23,160,789.68	388,687.64	101.22233	-142.2	0.9999673
05	23,154,716.34	394,760.98	101.22267	-144.9	0.9999666
42° 06'	23,148,642.98	400,834.34	101.22283	-147.3	0.9999661
07	23,142,569.61	406,907.71	101.22317	-149.3	0.9999656
08	23,136,496.22	412,981.10	101.22350	-151.0	0.9999652
09	23,130,422.81	419,054.51	101.22367	-152.3	0.9999649
10	23,124,349.39	425,127.93	101.22400	-153.2	0.9999647

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE I (Cont'd)

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
42° 11'	23,118,275.95	431,201.37	101.22417	-153.7	0.9999646
12	23,112,202.50	437,274.82	101.22450	-153.9	0.9999646
13	23,106,129.03	443,348.29	101.22500	-153.8	0.9999646
14	23,100,055.53	449,421.79	101.22517	-153.2	0.9999647
15	23,093,982.02	455,495.30	101.22550	-152.3	0.9999649
42° 16'	23,087,908.49	461,568.83	101.22583	-151.0	0.9999652
17	23,081,834.94	467,642.38	101.22617	-149.4	0.9999656
18	23,075,761.37	473,715.95	101.22650	-147.4	0.9999661
19	23,069,687.78	479,789.54	101.22683	-145.0	0.9999666
20	23,063,614.17	485,863.15	101.22717	-142.3	0.9999672
42° 21'	23,057,540.54	491,936.78	101.22767	-139.2	0.9999679
22	23,051,466.88	498,010.44	101.22800	-135.7	0.9999688
23	23,045,393.20	504,084.12	101.22850	-131.9	0.9999696
24	23,039,319.49	510,157.83	101.22883	-127.7	0.9999706
25	23,033,245.76	516,231.56	101.22917	-123.2	0.9999716
42° 26'	23,027,172.01	522,305.31	101.22950	-118.2	0.9999728
27	23,021,098.24	528,379.08	101.23017	-112.9	0.9999740
28	23,015,024.43	534,452.89	101.23050	-107.2	0.9999753
29	23,008,950.60	540,526.72	101.23083	-101.2	0.9999767
30	23,002,876.75	546,600.57	101.23150	-94.8	0.9999782
42° 31'	22,996,802.86	552,674.46	101.23183	-88.0	0.9999797
32	22,990,728.95	558,748.37	101.23233	-80.9	0.9999814
33	22,984,655.01	564,822.31	101.23267	-73.4	0.9999831
34	22,978,581.05	570,896.27	101.23333	-65.5	0.9999849
35	22,972,507.05	576,970.27	101.23367	-57.3	0.9999868
42° 36'	22,966,433.03	583,044.29	101.23433	-48.7	0.9999888
37	22,960,358.97	589,118.35	101.23483	-39.7	0.9999909
38	22,954,284.88	595,192.44	101.23533	-30.3	0.9999930
39	22,948,210.76	601,266.56	101.23583	-20.6	0.9999953
40	22,942,136.61	607,340.71	101.23633	-10.5	0.9999976
42° 41'	22,936,062.43	613,414.89	101.23700	0.0	1.0000000
42	22,929,988.21	619,489.11	101.23750	+ 10.8	1.0000025
43	22,923,913.96	625,563.36	101.23800	+ 22.0	1.0000051
44	22,917,839.68	631,637.64	101.23867	+ 33.6	1.0000077
45	22,911,765.36	637,711.96	101.23917	+ 45.5	1.0000105

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE I (Cont'd)

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
42° 46'	22,905,691.01	643,786.31	101.23983	+ 57.8	1.0000133
47	22,899,616.62	649,860.70	101.24033	+ 70.5	1.0000162
48	22,893,542.20	655,935.12	101.24100	+ 83.6	1.0000192
49	22,887,467.74	662,009.58	101.24167	+ 97.0	1.0000223
50	22,881,393.24	668,084.08	101.24217	+110.8	1.0000255
42° 51'	22,875,318.71	674,158.61	101.24283	+125.0	1.0000288
52	22,869,244.14	680,233.18	101.24350	+139.5	1.0000321
53	22,863,169.53	686,307.79	101.24417	+154.4	1.0000356
54	22,857,094.88	692,382.44	101.24483	+169.6	1.0000391
55	22,851,020.19	698,457.13	101.24550	+185.3	1.0000427
42° 56'	22,844,945.46	704,531.86	101.24617	+201.3	1.0000464
57	22,838,870.69	710,606.63	101.24683	+217.7	1.0000501
58	22,832,795.88	716,681.44	101.24767	+234.4	1.0000540
59	22,826,721.02	722,756.30	101.24817	+251.5	1.0000579
43° 00	22,820,646.13	728,831.19		+269.0	1.0000619

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE II

1" of Long. = 0.67172866 of θ

Long.	θ	Long.	θ	Long.	θ			
69° 50'	+1° 07'	10.3729	70° 26'	+0° 42'	50.4380	71° 01'	+0° 19'	28.8079
51	+1 06	30.0682	27	+0 42	19.1343	02	+0 13	48.5041
52	+1 05	49.7645	28	+0 41	38.3306	03	+0 13	08.2004
53	+1 05	09.4608	29	+0 40	58.5269	04	+0 17	27.8967
54	+1 04	29.1571	30	+0 40	18.2232	05	+0 16	47.5930
55	+1 03	48.8533						
69° 56'	+1 03	08.5486	70° 31'	+0 39	37.9104	71° 06'	+0 16	07.2893
57	+1 02	28.2459	32	+0 38	57.6157	07	+0 15	26.9355
58	+1 01	47.9422	33	+0 38	17.3120	08	+0 14	46.6818
59	+1 01	07.6385	34	+0 37	37.0083	09	+0 14	06.3781
70° 00'	+1 00	27.3347	35	+0 36	56.7046	10	+0 13	26.0741
70° 01'	+0 59	47.0310	70° 36'	+0 36	16.4008	71° 11'	+0 12	45.7707
02	+0 59	09.7273	37	+0 35	36.0971	12	+0 12	05.4669
03	+0 58	29.4236	38	+0 34	55.7934	13	+0 11	25.1632
04	+0 57	49.1199	39	+0 34	15.4897	14	+0 10	44.8595
05	+0 57	08.8161	40	+0 33	35.1860	15	+0 10	04.5558
70° 06'	+0 56	28.5124	70° 41'	+0 32	54.8823	71° 16'	+0 09	24.2521
07	+0 55	48.2087	42	+0 32	14.5785	17	+0 08	43.6434
08	+0 55	08.9050	43	+0 31	34.2748	18	+0 08	03.6446
09	+0 54	28.6013	44	+0 30	53.9711	19	+0 07	23.3409
10	+0 53	48.2976	45	+0 30	13.6574	20	+0 06	43.0372
70° 11'	+0 53	08.9938	70° 46'	+0 29	33.3637	71° 21'	+0 06	02.7335
12	+0 52	28.6901	47	+0 28	53.0599	22	+0 05	22.4298
13	+0 51	48.3864	48	+0 28	12.7562	23	+0 04	42.1260
14	+0 51	08.0827	49	+0 27	32.4525	24	+0 04	01.8223
15	+0 50	27.7790	50	+0 26	52.1488	25	+0 03	21.5186
70° 16'	+0 49	48.4752	70° 51'	+0 26	11.8451	71° 26'	+0 02	41.2149
17	+0 49	08.1715	52	+0 25	31.5413	27	+0 02	00.9112
18	+0 48	27.8678	53	+0 24	51.2376	28	+0 01	20.6074
19	+0 47	47.5641	54	+0 24	10.9339	29	+0 00	40.3037
20	+0 47	07.2604	55	+0 23	30.6302	30	0 00	00.0000
70° 21'	+0 46	27.9566	70° 56'	+0 22	50.3265	71° 31'	-0 00	40.3037
22	+0 45	47.6529	57	+0 22	10.0227	32	-0 01	20.6074
23	+0 45	07.3492	58	+0 21	29.7190	33	-0 02	00.9112
24	+0 44	27.0455	59	+0 20	49.4153	34	-0 02	41.2149
25	+0 43	46.7418	71° 00'	+0 20	09.1116	35	-0 03	21.5186

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE II (Cont'd)

1" of Long. = 0!67172866 of θ

Long.	θ			Long.	θ			Long.	θ		
71° 36'	-0° 04'	01!8223		72° 11'	-0° 27'	32!4525		72° 46'	-0° 51'	03!0827	
37	-0 04	42.1260		12	-0 28	12.7562		47	-0 51	43.3864	
38	-0 05	22.4298		13	-0 28	53.0599		48	-0 52	23.6901	
39	-0 06	02.7335		14	-0 29	33.3637		49	-0 53	03.9938	
40	-0 06	43.0372		15	-0 30	13.6674		50	-0 53	44.2976	
71° 41'	-0 07	23.3409		72° 16'	-0 30	53.9711		72° 51'	-0 54	24.6013	
42	-0 08	03.6446		17	-0 31	34.2748		52	-0 55	04.9050	
43	-0 08	43.9484		18	-0 32	14.5785		53	-0 55	45.2087	
44	-0 09	24.2521		19	-0 32	54.8823		54	-0 56	25.5124	
45	-0 10	04.5558		20	-0 33	35.1860		55	-0 57	05.8161	
71° 46'	-0 10	44.8595		72° 21'	-0 34	15.4897		72° 56'	-0 57	46.1199	
47	-0 11	25.1632		22	-0 34	55.7934		57	-0 58	26.4236	
48	-0 12	05.4669		23	-0 35	36.0971		58	-0 59	06.7273	
49	-0 12	45.7707		24	-0 36	16.4008		59	-0 59	47.0310	
50	-0 13	26.0744		25	-0 36	56.7046		73° 00'	-1 00	27.3347	
71° 51'	-0 14	06.3781		72° 26'	-0 37	37.0083		73° 01'	-1 01	07.6385	
52	-0 14	46.6818		27	-0 38	17.3120		02	-1 01	47.9422	
53	-0 15	26.9855		28	-0 38	57.6157		03	-1 02	28.2459	
54	-0 16	07.2893		29	-0 39	37.9194		04	-1 03	08.5496	
55	-0 16	47.5930		30	-0 40	18.2232		05	-1 03	48.8533	
71° 56'	-0 17	27.8967		72° 31'	-0 40	58.5269		73° 06'	-1 04	29.1571	
57	-0 18	08.2004		32	-0 41	38.8306		07	-1 05	09.4608	
58	-0 18	48.5041		33	-0 42	19.1343		08	-1 05	49.7645	
59	-0 19	28.8079		34	-0 42	59.4380		09	-1 06	30.0682	
72° 00'	-0 20	09.1116		35	-0 43	39.7418		10	-1 07	10.3719	
72° 01'	-0 20	49.4153		72° 36'	-0 44	20.0455		73° 11'	-1 07	50.6757	
02	-0 21	29.7190		37	-0 45	00.3492		12	-1 08	30.9794	
03	-0 22	10.0227		38	-0 45	40.6529		13	-1 09	11.2831	
04	-0 22	50.3265		39	-0 46	20.9566		14	-1 09	51.5868	
05	-0 23	30.6302		40	-0 47	01.2604		15	-1 10	31.8905	
72° 06'	-0 24	10.9339		72° 41'	-0 47	41.5641		73° 16'	-1 11	12.1943	
07	-0 24	51.2376		42	-0 48	21.8678		17	-1 11	52.4980	
08	-0 25	31.5413		43	-0 49	02.1715		18	-1 12	32.8017	
09	-0 26	11.8451		44	-0 49	42.4752		19	-1 13	13.1054	
10	-0 26	52.1488		45	-0 50	22.7790		20	-1 13	53.4091	

LAMBERT PROJECTION FOR MASSACHUSETTS

MAINLAND ZONE

TABLE II (Cont'd)

1" of Long. = 0.67172866 of θ

Long.		θ	
73° 21'	-1° 14'	33.7129	
22	-1 15	14.0166	
23	-1 15	54.3203	
24	-1 16	34.6240	
25	-1 17	14.9277	
73° 26'	-1 17	55.2315	
27	-1 18	35.5352	
28	-1 19	15.8389	
29	-1 19	56.1426	
30	-1 20	36.4463	
73° 31'	-1 21	16.7500	
32	-1 21	57.0538	
33	-1 22	37.3575	
34	-1 23	17.6612	
35	-1 23	57.9649	
73° 36'	-1 24	38.2686	
37	-1 25	18.5724	
38	-1 25	58.8761	
39	-1 26	39.1798	
40	-1 27	19.4835	

LAMBERT PROJECTION FOR MASSACHUSETTS

ISLAND ZONE

TABLE I

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
41° 00'	23,924,398.02	0	101.20867	+90.1	1.0000207
01	23,918,325.50	6,072.52	101.20883	+81.9	1.0000188
02	23,912,252.97	12,145.05	101.20900	+74.0	1.0000170
03	23,906,180.43	18,217.59	101.20900	+66.5	1.0000153
04	23,900,107.89	24,290.13	101.20933	+59.4	1.0000137
05	23,894,035.33	30,362.69	101.20933	+52.6	1.0000121
41° 06'	23,887,962.77	36,435.25	101.20950	+46.2	1.0000106
07	23,881,890.20	42,507.82	101.20967	+40.2	1.0000093
08	23,875,817.62	48,580.40	101.20967	+34.5	1.0000080
09	23,869,745.04	54,652.98	101.21000	+29.2	1.0000067
10	23,863,672.44	60,725.58	101.21033	+24.3	1.0000056
41° 11'	23,857,599.82	66,798.20	101.21033	+19.7	1.0000045
12	23,851,527.20	72,870.82	101.21050	+15.5	1.0000036
13	23,845,454.57	78,943.45	101.21083	+11.7	1.0000027
14	23,839,381.92	85,016.10	101.21100	+ 8.2	1.0000019
15	23,833,309.26	91,088.76	101.21133	+ 5.1	1.0000012
41° 16'	23,827,236.58	97,161.44	101.21150	+ 2.4	1.0000006
17	23,821,163.89	103,234.13	101.21167	0.0	1.0000000
18	23,815,091.19	109,306.83	101.21200	- 2.0	0.9999995
19	23,809,018.47	115,379.55	101.21233	- 3.6	0.9999992
20	23,802,945.73	121,452.29	101.21250	- 4.9	0.9999989
41° 21'	23,796,872.98	127,525.04	101.21283	- 5.8	0.9999987
22	23,790,800.21	133,597.81	101.21300	- 6.4	0.9999985
23	23,784,727.43	139,670.59	101.21333	- 6.6	0.9999985
24	23,778,654.63	145,743.39	101.21383	- 6.4	0.9999985
25	23,772,581.80	151,816.22	101.21400	- 5.8	0.9999987
41° 26'	23,766,508.96	157,889.06	101.21433	- 4.9	0.9999989
27	23,760,436.10	163,961.92	101.21467	- 3.6	0.9999992
28	23,754,363.22	170,034.80	101.21500	- 2.0	0.9999995
29	23,748,290.32	176,107.70	101.21533	0.0	1.0000000
30	23,742,217.40	182,180.62	101.21567	+ 2.4	1.0000006
41° 31'	23,736,144.46	188,253.56	101.21600	+ 5.1	1.0000012
32	23,730,071.50	194,326.52	101.21650	+ 8.2	1.0000019
33	23,723,998.51	200,399.51	101.21683	+11.7	1.0000027
34	23,717,925.50	206,472.52	101.21717	+15.6	1.0000036
35	23,711,852.47	212,545.55	101.21767	+19.8	1.0000046

LAMBERT PROJECTION FOR MASSACHUSETTS

ISLAND ZONE

TABLE I (Cont'd)

Lat.	R ft.	y' y value on central meri- dian ft.	Tabular dif- ference for 1 sec. of Lat. ft.	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
41° 36'	23,705,779.41	218,618.61	101.21800	+24.4	1.0000056
37	23,699,706.33	224,691.69	101.21850	+29.3	1.0000067
38	23,693,633.22	230,764.80	101.21883	+34.6	1.0000080
39	23,687,560.09	236,837.93	101.21933	+40.3	1.0000093
40	23,681,486.93	242,911.09		+46.3	1.0000107

LAMBERT PROJECTION FOR MASSACHUSETTS

ISLAND ZONE

TABLE II

1" of Long. = 0.66109540 of θ

Long.	θ		Long.	θ		Long.	θ	
69° 50'	+0° 26'	26.6290	70° 26'	+0° 02'	38.6629	71° 01'	-0° 20'	29.6374
51	+0 25	46.9632	27	+0 01	58.9972	02	-0 21	09.3032
52	+0 25	07.2975	28	+0 01	19.3314	03	-0 21	48.9689
53	+0 24	27.6318	29	+0 00	39.6657	04	-0 22	28.6346
54	+0 23	47.9661	30	0 00	00.0000	05	-0 23	08.3003
55	+0 23	08.3003						
69° 56'	+0 22	28.6346	70° 31'	-0 00	39.6657	71° 06'	-0 23	47.9661
57	+0 21	48.9689	32	-0 01	19.3314	07	-0 24	27.6318
58	+0 21	09.3032	33	-0 01	58.9972	08	-0 25	07.2975
59	+0 20	29.6374	34	-0 02	38.6629	09	-0 25	46.9632
70° 00	+0 19	49.9717	35	-0 03	18.3286	10	-0 26	26.6290
70° 01'	+0 19	10.3060	70° 36'	-0 03	57.9943			
02	+0 18	30.6403	37	-0 04	37.6601			
03	+0 17	50.9745	38	-0 05	17.3258			
04	+0 17	11.3088	39	-0 05	56.9915			
05	+0 16	31.6431	40	-0 06	36.6572			
70° 06'	+0 15	51.9774	70° 41'	-0 07	16.3230			
07	+0 15	12.3117	42	-0 07	55.9887			
08	+0 14	32.6459	43	-0 08	35.6544			
09	+0 13	52.9802	44	-0 09	15.3201			
10	+0 13	13.3145	45	-0 09	54.9859			
70° 11'	+0 12	33.6488	70° 46'	-0 10	34.6516			
12	+0 11	53.9830	47	-0 11	14.3173			
13	+0 11	14.3173	48	-0 11	53.9830			
14	+0 10	34.6516	49	-0 12	33.6488			
15	+0 09	54.9859	50	-0 13	13.3145			
70° 16'	+0 09	15.3201	70° 51'	-0 13	52.9802			
17	+0 08	35.6544	52	-0 14	32.6459			
18	+0 07	55.9887	53	-0 15	12.3117			
19	+0 07	15.3230	54	-0 15	51.9774			
20	+0 06	36.6572	55	-0 16	31.6431			
70° 21'	+0 05	56.9915	70° 56'	-0 17	11.3088			
22	+0 05	17.3258	57	-0 17	50.9745			
23	+0 04	37.6601	58	-0 18	30.6403			
24	+0 03	57.9943	59	-0 19	10.3060			
25	+0 03	18.3286	71° 00	-0 19	49.9717			

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

For Lambert Projection				For Lambert or transverse Mercator Projection		
<u>$\Delta\theta'$ as argument</u>				<u>Δy</u> or <u>Δx</u>	<u>Corr'n</u>	
<u>$\Delta\theta'$</u>	<u>Corr'n</u> (Plus)	<u>$\Delta\theta'$</u>	<u>Corr'n</u> (Plus)		<u>(Plus)</u>	
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	

$\Delta\theta'$ 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.