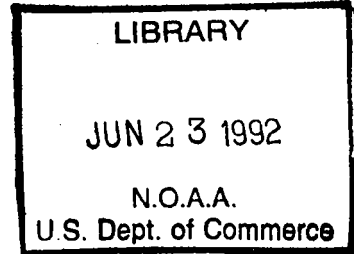


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U. S. Department of Commerce
Sinclair Weeks, Secretary
Coast and Geodetic Survey
Robert F. A. Studds, Director

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PLANE COORDINATE PROJECTION TABLES MISSOURI



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Foreword

The plane coordinate system used in this State is based on the transverse Mercator projection using a reduced scale for the central meridian of the 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. All of the functions that are required are given in this publication.

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

Plane coordinates from geographic positions

$$x = x' + 500,000$$

$$x' = H \cdot \Delta\lambda'' \pm a b$$

$$y = y_0 + v \left(\frac{\Delta\lambda''}{100} \right)^2 \pm c$$

Grid azimuth = geodetic azimuth - $\Delta\alpha$ - second term

$$\Delta\alpha'' = \Delta\lambda'' \sin \phi + g$$

where

y_0 , H , V , and a are based on the latitude
of the geographic position,

and

b , c , and g are based on $\Delta\lambda''$.

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

and

$\Delta\alpha''$ is the convergence of the meridian at the station with respect to the Central Meridian.

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.

$$\text{Second term} = \frac{(y_2 - y_1) (2x'_1 + x'_2)}{(6\rho_0^2 \sin 1'')_g}$$

Geographic positions from plane coordinates

$$P (x'/10,000)^2 + d = V (\Delta\lambda''/100)^2 + c$$

$$y_0 = y - P (x'/10,000)^2 - d$$

Obtain the latitude from the table of y_0 .

Use latitude to obtain H from the table.

$$x' = x - 500,000$$

$$\text{approximate } \Delta\lambda'' = x' \div H.$$

Determine a from latitude and b from approximate $\Delta\lambda$

then

$$\Delta\lambda'' = (x' + a b) \div H$$

$$\Delta\alpha'' = Mx' - e$$

M is based on the y, and e on the x and y of the plane coordinates.

PLANE COORDINATES ON TRANSVERSE MERCATOR PROJECTION
(Condensed form for calculating-machine computation)

State Missouri Zone East Central meridian 90° 30' 00".000

Station	<u>Ashley, 1939</u>	<u>Rock, 1938</u>			
ϕ	<u>37° 22' 05".932</u>	<u>36° 53' 44".124</u>			
λ	<u>91 42 04.297</u>	<u>90 08 08.896</u>			
$\Delta\lambda = \text{Central mer.} - \lambda$	<u>-1° 12' 04".297</u>	<u>+0° 21' 51".104</u>			
$\Delta\lambda''$	<u>-4,324.297</u>	<u>+1,311.104</u>			
$\left(\frac{\Delta\lambda''}{100}\right)^2$	<u>1,869.954</u>	<u>171.899</u>			
H	<u>80.725 714</u>	<u>81.229 525</u>			
V	<u>1.187 888</u>	<u>1.182 348</u>			
a	<u>-0.821</u>	<u>+1.915</u>	b	<u>-0.875</u>	<u>+2.849</u>
$x' = H \cdot \Delta\lambda \pm ab$	<u>-349,080.39</u>	<u>+106,497.86</u>			
$V \left(\frac{\Delta\lambda''}{100}\right)^2 \pm c$	<u>2,221.21</u>	<u>203.21</u>			
Tabular y	<u>558,797.04</u>	<u>386,690.10</u>			
x	<u>150,919.61</u>	<u>606,497.86</u>			
y	<u>561,018.25</u>	<u>386,893.31</u>			
$\Delta\alpha''$	<u>-2,624.82</u>	<u>+787.14</u>			
$\Delta\alpha$	<u>-0° 43' 44".8</u>	<u>+0° 13' 07".1</u>			
Geod. Az. to Az. Mk.	<u>194 45 02.8</u>	<u>132 18 55.2</u>			
Grid Az. to Az. Mk.	<u>195 28 48</u>	<u>132 05 48</u>			

$$x = x' + 500,000$$

$$y = \text{Tab. } y + V \left(\frac{\Delta\lambda''}{100}\right)^2 \pm c$$

$$\Delta\alpha'' = \Delta\lambda'' \sin\phi + g$$

$$\text{Grid Az.} = \text{Geod. Az.} - \Delta\alpha$$

H and $V = \text{Tab. } H$ and $\text{Tab. } V$.

When ab is $\frac{-}{+}$, $\frac{\text{decrease}}{\text{increase}}$ $H \cdot \Delta\lambda$ numerically.

g increases $\Delta\lambda'' \cdot \sin\phi$ numerically.

6

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES
(CALCULATING MACHINE COMPUTATION)

STATE - ZONE Missouri - East

Station Ashley, 1939

X	150,919.61		Y	561,018.25
C	- 500,000.00		$P(\frac{X'}{10,000})^2 + d$	- 2.221.23
X'	- 349,080.39		Y_0	558,797.02
P	1.82278		Approx. $\Delta\lambda = X' \div H$	- 4,324
d	+ 0.04		$\Delta\lambda = (X' \mp ab) \div H$	- 4,324.297
H	80.725 714		$\Delta\lambda$	- 1 12' 04".297
a	b	- 0.821 + 1.9185	Central Meridian	90 30 00.000
ϕ	37° 22' 05".932		$\lambda = \text{C.M.} - \Delta\lambda$	91° 42' 04".297

Station Rock, 1938

X	606,497.86		Y	386,893.31
C	- 500,000.00		$P(\frac{X'}{10,000})^2 + d$	- 203.20
X'	+ 106,497.86		Y_0	386,690.11
P	1.79147		Approx. $\Delta\lambda = X' \div H$	+ 1,311
d	+ 0.02		$\Delta\lambda = (X' \mp ab) \div H$	+ 1,311.104
H	81.229 525		$\Delta\lambda$	+ 0° 21' 51".104
a	b	- 0.875 + 2.849	Central Meridian	90 30 00.000
ϕ	36° 53' 44".124		$\lambda = \text{C.M.} - \Delta\lambda$	90° 08' 08".896

Station

X			Y	
C	-		$P(\frac{X'}{10,000})^2 + d$	-
X'			Y_0	
P			Approx. $\Delta\lambda = X' \div H$	"
d			$\Delta\lambda = (X' \mp ab) \div H$	"
H			$\Delta\lambda$	"
a	b		Central Meridian	
ϕ			$\lambda = \text{C.M.} - \Delta\lambda$	"

Station

X			Y	
C	-		$P(\frac{X'}{10,000})^2 + d$	-
X'			Y_0	
P			Approx. $\Delta\lambda = X' \div H$	"
d			$\Delta\lambda = (X' \mp ab) \div H$	"
H			$\Delta\lambda$	"
a	b		Central Meridian	
ϕ			$\lambda = \text{C.M.} - \Delta\lambda$	"

When ab is $\frac{+, \text{ decrease}}{-, \text{ increase}}$ X' numerically

Constants for Missouri

Constant	Zone		
	East	Central	West
Central Meridian	90° 30' 00".000	92° 30' 00".000	94° 30' 00".000
log R	-289.5	-289.5	-255.5
Scale reduction (Central Meridian)	1 : 15,000	1 : 15,000	1 : 17,000
$\log \left(\frac{1}{6\rho_0^2} \right)_g$	4.581 2261 -20	4.581 2010 -20	4.581 1942 -20
$\log \left(\frac{1}{6\rho_0^2 \sin 1''} \right)_g$	9.895 6512 -20	9.895 6261 -20	9.895 6193 -20
$\left(\frac{1}{6\rho_0^2 \sin 1''} \right)_g$	0.7864×10^{-10}	0.7864×10^{-10}	0.7864×10^{-10}

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.	y ₀ feet	Δy ₀ per second	H	ΔH per second	V	ΔV per second	a
35 50	0 00	101.109 67	82.341 366	287.11	1.168 731	3.76	1.000
35 51	6 066.58	101.110 00	82.324 139	287.21	1.168 957	3.76	-.998
35 52	12 133.18	101.110 17	82.306 906	287.35	1.169 183	3.75	-.996
35 53	18 199.79	101.110 50	82.289 665	287.45	1.169 408	3.73	-.994
35 54	24 266.42	101.110 83	82.272 418	287.58	1.169 632	3.75	-.992
35 55	30 333.07	101.111 00	82.255 163	287.68	1.169 857	3.73	-.990
35 56	36 399.73	101.111 33	82.237 902	287.81	1.170 081	3.71	-.988
35 57	42 466.41	101.111 67	82.220 633	287.91	1.170 304	3.73	-.986
35 58	48 533.11	101.112 00	82.203 358	288.05	1.170 528	3.71	-.984
35 59	54 599.83	101.112 17	82.186 075	288.15	1.170 751	3.70	-.982
36 00	60 666.56		82.168 786		1.170 973		-.980

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.	y. feet	Δy . per second	H	ΔH per second	V	ΔV per second	a
36 00	60 666.56	101.112 50	82.168 786	288.26	1.170 973	3.70	-.980
36 01	66 733.31	101.112 83	82.151 490	288.40	1.171 195	3.70	-.978
36 02	72 800.08	101.113 17	82.134 186	288.50	1.171 417	3.68	-.976
36 03	78 866.87	101.113 33	82.116 876	288.61	1.171 638	3.68	-.974
36 04	84 933.67	101.113 67	82.099 559	288.75	1.171 859	3.66	-.972
36 05	91 000.49	101.113 83	82.082 234	288.85	1.172 079	3.66	-.970
36 06	97 067.32	101.114 17	82.064 903	288.96	1.172 299	3.66	-.968
36 07	103 134.17	101.114 50	82.047 565	289.08	1.172 519	3.66	-.966
36 08	109 201.04	101.114 83	82.030 220	289.20	1.172 739	3.63	-.964
36 09	115 267.93	101.115 00	82.012 868	289.31	1.172 957	3.65	-.962
36 10	121 334.83	101.115 50	81.995 509	289.43	1.173 176	3.63	-.960
36 11	127 401.76	101.115 67	81.978 143	289.55	1.173 394	3.63	-.958
36 12	133 468.70	101.115 83	81.960 770	289.66	1.173 612	3.61	-.956
36 13	139 535.65	101.116 17	81.943 390	289.78	1.173 829	3.61	-.954
36 14	145 602.62	101.116 50	81.926 003	289.88	1.174 046	3.61	-.952
36 15	151 669.61	101.116 83	81.908 610	290.01	1.174 263	3.60	-.950
36 16	157 736.62	101.117 00	81.891 209	290.13	1.174 479	3.60	-.948
36 17	163 803.64	101.117 33	81.873 801	290.23	1.174 695	3.58	-.946
36 18	169 870.68	101.117 67	81.856 387	290.36	1.174 910	3.58	-.944
36 19	175 937.74	101.118 00	81.838 965	290.46	1.175 125	3.58	-.942
36 20	182 004.82	101.118 17	81.821 537	290.58	1.175 340	3.56	-.940
36 21	188 071.91	101.118 50	81.804 102	290.70	1.175 554	3.56	-.938
36 22	194 139.02	101.118 67	81.786 660	290.83	1.175 768	3.55	-.936
36 23	200 206.14	101.119 17	81.769 210	290.93	1.175 981	3.55	-.934
36 24	206 273.29	101.119 33	81.751 754	291.05	1.176 194	3.55	-.932
36 25	212 340.45	101.119 67	81.734 291	291.16	1.176 407	3.53	-.930
36 26	218 407.63	101.120 00	81.716 821	291.28	1.176 619	3.53	-.928
36 27	224 474.83	101.120 17	81.699 344	291.38	1.176 831	3.51	-.926
36 28	230 542.04	101.120 50	81.681 861	291.51	1.177 042	3.51	-.924
36 29	236 609.27	101.120 83	81.664 370	291.63	1.177 253	3.51	-.922
36 30	242 676.52	101.121 00	81.646 872	291.75	1.177 464	3.50	-.920
36 31	248 743.78	101.121 33	81.629 367	291.86	1.177 674	3.50	-.918
36 32	254 811.06	101.121 67	81.611 855	291.96	1.177 884	3.50	-.916
36 33	260 878.36	101.122 00	81.594 337	292.10	1.178 094	3.48	-.914
36 34	266 945.68	101.122 17	81.576 811	292.20	1.178 303	3.48	-.912
36 35	273 013.01	101.122 50	81.559 279	292.33	1.178 512	3.46	-.911
36 36	279 080.36	101.122 83	81.541 739	292.43	1.178 720	3.46	-.909
36 37	285 147.73	101.123 00	81.524 193	292.55	1.178 928	3.45	-.907
36 38	291 215.11	101.123 33	81.506 640	292.66	1.179 135	3.45	-.905
36 39	297 282.51	101.123 67	81.489 080	292.78	1.179 342	3.45	-.903
36 40	303 349.93	101.124 00	81.471 513	292.90	1.179 549	3.43	-.901
36 41	309 417.37	101.124 17	81.453 939	293.01	1.179 755	3.43	-.899
36 42	315 484.82	101.124 50	81.436 358	293.11	1.179 961	3.43	-.897
36 43	321 552.29	101.124 83	81.418 771	293.25	1.180 167	3.41	-.895
36 44	327 619.78	101.125 00	81.401 176	293.35	1.180 372	3.41	-.893
36 45	333 687.28	101.125 50	81.383 575	293.48	1.180 577	3.40	-.892
36 46	339 754.81	101.125 67	81.365 966	293.58	1.180 781	3.40	-.890
36 47	345 822.35	101.125 83	81.348 351	293.70	1.180 985	3.38	-.888
36 48	351 889.90	101.126 33	81.330 729	293.81	1.181 188	3.38	-.886
36 49	357 957.48	101.126 50	81.313 100	293.93	1.181 391	3.38	-.884
36 50	364 025.07	101.126 83	81.295 464	294.05	1.181 594	3.36	-.882
36 51	370 092.68	101.127 00	81.277 821	294.16	1.181 796	3.36	-.880
36 52	376 160.30	101.127 33	81.260 171	294.26	1.181 998	3.36	-.878
36 53	382 227.94	101.127 67	81.242 515	294.40	1.182 200	3.35	-.876
36 54	388 295.60	101.128 00	81.224 851	294.50	1.182 401	3.35	-.874
36 55	394 363.28	101.128 33	81.207 181	294.63	1.182 602	3.33	-.873
36 56	400 430.98	101.128 50	81.189 503	294.73	1.182 802	3.33	-.871
36 57	406 498.69	101.128 83	81.171 819	294.85	1.183 002	3.31	-.869
36 58	412 566.42	101.129 00	81.154 128	294.96	1.183 201	3.31	-.867
36 59	418 634.16	101.129 50	81.136 430	295.08	1.183 400	3.31	-.865
37 00	424 701.93		81.118 725		1.183 599		-.863

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.	Y ₀ feet	ΔY ₀ per second	H	ΔH per second	V	ΔV per second	a
37 00	424 701.93	101.129 67	81.118 725	295.20	1.183 599	3.30	-.863
37 01	430 769.71	101.130 00	81.101 013	295.31	1.183 797	3.30	-.861
37 02	436 837.51	101.130 17	81.083 294	295.41	1.183 995	3.30	-.859
37 03	442 905.32	101.130 50	81.065 569	295.53	1.184 193	3.28	-.857
37 04	448 973.15	101.130 83	81.047 837	295.66	1.184 390	3.28	-.855
37 05	455 041.00	101.131 17	81.030 097	295.76	1.184 587	3.26	-.854
37 06	461 108.87	101.131 50	81.012 351	295.88	1.184 783	3.26	-.852
37 07	467 176.76	101.131 67	80.994 598	296.00	1.184 979	3.25	-.850
37 08	473 244.66	101.132 00	80.976 838	296.10	1.185 174	3.25	-.848
37 09	479 312.58	101.132 17	80.959 072	296.23	1.185 369	3.25	-.846
37 10	485 380.51	101.132 67	80.941 298	296.33	1.185 564	3.23	-.844
37 11	491 448.47	101.132 83	80.923 518	296.46	1.185 758	3.23	-.842
37 12	497 516.44	101.133 17	80.905 730	296.56	1.185 952	3.23	-.840
37 13	503 584.43	101.133 33	80.887 936	296.68	1.186 146	3.21	-.838
37 14	509 652.43	101.133 83	80.870 135	296.80	1.186 339	3.20	-.836
37 15	515 720.46	101.134 00	80.852 327	296.90	1.186 531	3.21	-.835
37 16	521 788.50	101.134 17	80.834 513	297.03	1.186 724	3.20	-.833
37 17	527 856.55	101.134 67	80.816 691	297.13	1.186 916	3.18	-.831
37 18	533 924.63	101.134 83	80.798 863	297.26	1.187 107	3.18	-.829
37 19	539 992.73	101.135 17	80.781 027	297.36	1.187 297	3.18	-.827
37 20	546 060.83	101.135 50	80.763 185	297.48	1.187 489	3.16	-.825
37 21	552 128.96	101.135 67	80.745 336	297.60	1.187 679	3.16	-.823
37 22	558 197.10	101.136 00	80.727 480	297.71	1.187 869	3.16	-.821
37 23	564 265.26	101.136 33	80.709 617	297.83	1.188 059	3.15	-.819
37 24	570 333.44	101.136 67	80.691 747	297.93	1.188 248	3.15	-.817
37 25	576 401.64	101.136 83	80.673 871	298.06	1.188 437	3.15	-.816
37 26	582 469.85	101.137 17	80.655 987	298.16	1.188 626	3.13	-.814
37 27	588 538.08	101.137 50	80.638 097	298.28	1.188 814	3.11	-.812
37 28	594 606.33	101.137 83	80.620 200	298.40	1.189 001	3.11	-.810
37 29	600 674.60	101.138 00	80.602 296	298.51	1.189 188	3.11	-.808
37 30	606 742.88	101.138 33	80.584 385	298.63	1.189 375	3.10	-.806
37 31	612 811.18	101.138 67	80.566 467	298.73	1.189 561	3.10	-.804
37 32	618 879.50	101.138 83	80.548 543	298.86	1.189 747	3.10	-.802
37 33	624 947.83	101.139 17	80.530 611	298.96	1.189 933	3.08	-.800
37 34	631 016.18	101.139 50	80.512 673	299.08	1.190 118	3.08	-.798
37 35	637 084.55	101.139 83	80.494 728	299.20	1.190 303	3.06	-.797
37 36	643 152.94	101.140 17	80.476 776	299.30	1.190 487	3.06	-.795
37 37	649 221.35	101.140 33	80.458 818	299.43	1.190 671	3.05	-.793
37 38	655 289.77	101.140 67	80.440 852	299.53	1.190 854	3.05	-.791
37 39	661 358.21	101.141 00	80.422 880	299.65	1.191 037	3.05	-.789
37 40	667 426.67	101.141 17	80.404 901	299.76	1.191 220	3.03	-.787
37 41	673 495.14	101.141 50	80.386 915	299.86	1.191 402	3.03	-.785
37 42	679 563.63	101.141 83	80.368 923	300.00	1.191 584	3.03	-.783
37 43	685 632.14	101.142 17	80.350 923	300.10	1.191 766	3.01	-.781
37 44	691 700.67	101.142 33	80.332 917	300.21	1.191 947	3.01	-.779
37 45	697 769.21	101.142 67	80.314 904	300.33	1.192 128	3.00	-.778
37 46	703 837.77	101.143 00	80.296 884	300.45	1.192 308	3.00	-.776
37 47	709 906.35	101.143 17	80.278 857	300.55	1.192 488	2.98	-.774
37 48	715 974.94	101.143 67	80.260 824	300.68	1.192 667	2.98	-.772
37 49	722 043.56	101.143 83	80.242 783	300.78	1.192 846	2.98	-.770
37 50	728 112.19	101.144 17	80.224 736	300.90	1.193 025	2.96	-.768
37 51	734 180.84	101.144 33	80.206 682	301.01	1.193 203	2.96	-.766
37 52	740 249.50	101.144 67	80.188 621	301.13	1.193 381	2.96	-.764
37 53	746 318.18	101.145 00	80.170 553	301.25	1.193 559	2.95	-.762
37 54	752 386.88	101.145 33	80.152 478	301.35	1.193 736	2.95	-.760
37 55	758 455.60	101.145 67	80.134 397	301.48	1.193 913	2.93	-.759
37 56	764 524.34	101.145 83	80.116 308	301.58	1.194 089	2.93	-.757
37 57	770 593.09	101.146 17	80.098 213	301.68	1.194 265	2.91	-.755
37 58	776 661.86	101.146 50	80.080 112	301.81	1.194 440	2.91	-.753
37 59	782 730.65	101.146 67	80.062 003	301.91	1.194 615	2.91	-.751
38 00	788 799.45		80.043 888		1.194 790		-.749

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.	Y ₀ feet	ΔY ₀ per second	H	ΔH per second	V	ΔV per second	a	
38 00	788	799.45	101.147 00	80.043 888	302.03	1.194 790	2.90	-.749
38 01	794	868.27	101.147 33	80.025 766	302.15	1.194 964	2.90	-.747
38 02	800	937.11	101.147 67	80.007 637	302.25	1.195 138	2.90	-.745
38 03	807	005.97	101.148 00	79.989 502	302.36	1.195 312	2.88	-.743
38 04	813	074.85	101.148 17	79.971 360	302.48	1.195 485	2.88	-.741
38 05	819	143.74	101.148 50	79.953 211	302.60	1.195 658	2.86	-.740
38 06	825	212.65	101.148 83	79.935 055	302.71	1.195 830	2.86	-.738
38 07	831	281.58	101.149 00	79.916 892	302.83	1.196 002	2.85	-.736
38 08	837	350.52	101.149 33	79.898 722	302.93	1.196 173	2.85	-.734
38 09	843	419.48	101.149 67	79.880 546	303.05	1.196 344	2.85	-.732
38 10	849	488.46	101.150 00	79.862 363	303.16	1.196 515	2.83	-.730
38 11	855	557.46	101.150 17	79.844 173	303.28	1.196 685	2.83	-.728
38 12	861	626.47	101.150 50	79.825 976	303.38	1.196 855	2.81	-.726
38 13	867	695.50	101.150 83	79.807 773	303.51	1.197 024	2.81	-.724
38 14	873	764.55	101.151 17	79.789 562	303.61	1.197 193	2.81	-.722
38 15	879	833.62	101.151 33	79.771 345	303.73	1.197 362	2.80	-.721
38 16	885	902.70	101.151 67	79.753 121	303.83	1.197 530	2.78	-.719
38 17	891	971.80	101.152 00	79.734 891	303.96	1.197 697	2.80	-.717
38 18	898	040.92	101.152 33	79.716 653	304.08	1.197 865	2.78	-.715
38 19	904	110.06	101.152 50	79.698 409	304.18	1.198 032	2.76	-.713
38 20	910	179.21	101.152 83	79.680 158	304.30	1.198 198	2.76	-.711
38 21	916	248.38	101.153 17	79.661 900	304.41	1.198 364	2.76	-.709
38 22	922	317.57	101.153 50	79.643 635	304.51	1.198 530	2.75	-.707
38 23	928	386.78	101.153 67	79.625 364	304.63	1.198 695	2.75	-.705
38 24	934	455.00	101.154 00	79.607 086	304.75	1.198 860	2.75	-.703
38 25	940	525.24	101.154 33	79.588 801	304.85	1.199 025	2.73	-.702
38 26	946	594.50	101.154 67	79.570 510	304.98	1.199 189	2.71	-.700
38 27	952	663.78	101.154 83	79.552 211	305.08	1.199 352	2.73	-.698
38 28	958	733.07	101.155 33	79.533 906	305.20	1.199 516	2.71	-.696
38 29	964	802.39	101.155 50	79.515 594	305.30	1.199 679	2.70	-.694
38 30	970	871.72	101.155 67	79.497 276	305.41	1.199 841	2.70	-.692
38 31	976	941.06	101.156 17	79.478 951	305.53	1.200 003	2.70	-.690
38 32	983	010.43	101.156 33	79.460 619	305.65	1.200 165	2.68	-.688
38 33	989	079.81	101.156 67	79.442 280	305.75	1.200 326	2.68	-.686
38 34	995	149.21	101.156 83	79.423 935	305.86	1.200 487	2.68	-.684
38 35	1 001	218.62	101.157 33	79.405 583	305.98	1.200 648	2.66	-.683
38 36	1 007	288.06	101.157 50	79.387 224	306.10	1.200 809	2.65	-.681
38 37	1 013	357.51	101.157 83	79.368 858	306.20	1.200 967	2.66	-.679
38 38	1 019	426.98	101.158 00	79.350 486	306.31	1.201 127	2.65	-.677
38 39	1 025	496.46	101.158 50	79.332 107	306.43	1.201 286	2.63	-.675
38 40	1 031	565.97	101.158 67	79.313 721	306.55	1.201 444	2.63	-.673
38 41	1 037	635.49	101.159 00	79.295 328	306.66	1.201 602	2.61	-.671
38 42	1 043	705.03	101.159 33	79.276 929	306.76	1.201 760	2.61	-.669
38 43	1 049	774.59	101.159 50	79.258 523	306.88	1.201 917	2.61	-.667
38 44	1 055	844.16	101.159 83	79.240 110	306.99	1.202 074	2.60	-.665
38 45	1 061	913.75	101.160 17	79.221 690	307.10	1.202 230	2.60	-.664
38 46	1 067	983.36	101.160 50	79.203 264	307.21	1.202 386	2.60	-.662
38 47	1 074	052.99	101.160 67	79.184 831	307.33	1.202 542	2.58	-.660
38 48	1 080	122.63	101.161 17	79.166 391	307.45	1.202 697	2.58	-.658
38 49	1 086	192.30	101.161 33	79.147 944	307.55	1.202 852	2.56	-.656
38 50	1 092	261.98	101.161 50	79.129 491	307.66	1.203 006	2.56	-.654
38 51	1 098	331.67	101.162 00	79.111 031	307.78	1.203 160	2.55	-.652
38 52	1 104	401.39	101.162 17	79.092 564	307.88	1.203 313	2.55	-.650
38 53	1 110	471.12	101.162 50	79.074 091	308.00	1.203 467	2.53	-.648
38 54	1 116	540.87	101.162 83	79.055 611	308.11	1.203 619	2.53	-.646
38 55	1 122	610.64	101.163 00	79.037 124	308.23	1.203 772	2.53	-.645
38 56	1 128	680.42	101.163 50	79.018 630	308.33	1.203 924	2.51	-.643
38 57	1 134	750.23	101.163 67	79.000 130	308.45	1.204 075	2.51	-.641
38 58	1 140	820.05	101.163 83	78.981 623	308.56	1.204 226	2.51	-.639
38 59	1 146	889.88	101.164 33	78.963 109	308.66	1.204 377	2.50	-.637
39 00	1 152	959.74		78.944 589		1.204 527		-.635

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.		y ₀ feet	Δy ₀ per second		H	ΔH per second	v	Δv per second	a
39 00	1	152 959.74	101.164 50		78.944 589	308.78	1.204 527	2.50	-.635
39 01	1	159 029.61	101.164 83		78.926 062	308.90	1.204 677	2.48	-.633
39 02	1	165 099.50	101.165 17		78.907 528	309.01	1.204 826	2.48	-.631
39 03	1	171 169.41	101.165 50		78.888 987	309.11	1.204 975	2.48	-.629
39 04	1	177 239.34	101.165 67		78.870 440	309.23	1.205 124	2.46	-.627
39 05	1	183 309.28	101.166 00		78.851 886	309.35	1.205 272	2.46	-.626
39 06	1	189 379.24	101.166 33		78.833 325	309.45	1.205 420	2.45	-.624
39 07	1	195 449.22	101.166 50		78.814 758	309.56	1.205 567	2.45	-.622
39 08	1	201 519.21	101.167 00		78.796 184	309.68	1.205 714	2.45	-.620
39 09	1	207 589.23	101.167 17		78.777 603	309.78	1.205 861	2.43	-.618
39 10	1	213 659.26	101.167 50		78.759 016	309.90	1.206 007	2.43	-.616
39 11	1	219 729.31	101.167 83		78.740 422	310.01	1.206 153	2.41	-.614
39 12	1	225 799.38	101.168 00		78.721 821	310.11	1.206 298	2.41	-.612
39 13	1	231 869.46	101.168 33		78.703 214	310.23	1.206 443	2.40	-.610
39 14	1	237 939.56	101.168 67		78.684 600	310.35	1.206 587	2.41	-.608
39 15	1	244 009.68	101.169 00		78.665 979	310.45	1.206 732	2.38	-.607
39 16	1	250 079.82	101.169 17		78.647 352	310.56	1.206 875	2.40	-.605
39 17	1	256 149.97	101.169 50		78.628 718	310.68	1.207 019	2.38	-.603
39 18	1	262 220.14	101.169 83		78.610 077	310.80	1.207 161	2.38	-.601
39 19	1	268 290.33	101.170 17		78.591 429	310.90	1.207 304	2.36	-.599
39 20	1	274 360.54	101.170 50		78.572 775	311.01	1.207 446	2.36	-.597
39 21	1	280 430.77	101.170 67		78.554 114	311.13	1.207 588	2.35	-.595
39 22	1	286 501.01	101.171 00		78.535 446	311.23	1.207 729	2.35	-.593
39 23	1	292 571.27	101.171 33		78.516 772	311.35	1.207 870	2.35	-.591
39 24	1	298 641.55	101.171 50		78.498 091	311.46	1.208 011	2.33	-.589
39 25	1	304 711.84	101.172 00		78.479 403	311.56	1.208 151	2.31	-.588
39 26	1	310 782.16	101.172 17		78.460 709	311.68	1.208 290	2.33	-.586
39 27	1	316 852.49	101.172 50		78.442 008	311.80	1.208 430	2.31	-.584
39 28	1	322 922.84	101.172 67		78.423 300	311.90	1.208 569	2.30	-.582
39 29	1	328 993.20	101.173 17		78.404 586	312.01	1.208 707	2.30	-.580
39 30	1	335 063.59	101.173 33		78.385 865	312.11	1.208 845	2.30	-.578
39 31	1	341 133.99	101.173 67		78.367 138	312.25	1.208 983	2.28	-.576
39 32	1	347 204.41	101.173 83		78.348 403	312.33	1.209 120	2.26	-.574
39 33	1	353 274.84	101.174 33		78.329 663	312.46	1.209 256	2.28	-.572
39 34	1	359 345.30	101.174 50		78.310 915	312.56	1.209 393	2.26	-.570
39 35	1	365 415.77	101.174 83		78.292 161	312.66	1.209 529	2.25	-.569
39 36	1	371 486.26	101.175 17		78.273 401	312.80	1.209 664	2.25	-.567
39 37	1	377 556.77	101.175 33		78.254 633	312.90	1.209 799	2.25	-.565
39 38	1	383 627.29	101.175 67		78.235 859	313.01	1.209 934	2.23	-.563
39 39	1	389 697.83	101.176 17		78.217 078	313.11	1.210 068	2.23	-.561
39 40	1	395 768.40	101.176 33		78.198 291	313.23	1.210 202	2.21	-.559
39 41	1	401 838.98	101.176 50		78.179 497	313.33	1.210 335	2.21	-.557
39 42	1	407 909.57	101.176 83		78.160 696	313.45	1.210 468	2.21	-.555
39 43	1	413 980.18	101.177 17		78.141 889	313.58	1.210 601	2.20	-.554
39 44	1	420 050.81	101.177 50		78.123 074	313.66	1.210 733	2.20	-.552
39 45	1	426 121.46	101.177 83		78.104 254	313.80	1.210 865	2.20	-.550
39 46	1	432 192.13	101.178 00		78.085 426	313.88	1.210 997	2.18	-.548
39 47	1	438 262.81	101.178 33		78.066 593	314.01	1.211 128	2.16	-.546
39 48	1	444 333.51	101.178 67		78.047 752	314.11	1.211 258	2.16	-.545
39 49	1	450 404.23	101.179 00		78.028 905	314.23	1.211 388	2.16	-.543
39 50	1	456 474.97	101.179 33		78.010 051	314.33	1.211 518	2.15	-.541
39 51	1	462 545.73	101.179 50		77.991 191	314.45	1.211 647	2.15	-.539
39 52	1	468 616.50	101.179 83		77.972 324	314.56	1.211 776	2.15	-.537
39 53	1	474 687.29	101.180 17		77.953 450	314.66	1.211 905	2.13	-.536
39 54	1	480 758.10	101.180 33		77.934 570	314.78	1.212 033	2.13	-.534
39 55	1	486 828.92	101.180 83		77.915 683	314.90	1.212 161	2.11	-.532
39 56	1	492 899.77	101.181 00		77.896 789	315.00	1.212 288	2.11	-.530
39 57	1	498 970.63	101.181 17		77.877 889	315.11	1.212 415	2.10	-.528
39 58	1	505 041.50	101.181 67		77.858 982	315.21	1.212 541	2.10	-.527
39 59	1	511 112.40	101.182 00		77.840 069	315.33	1.212 667	2.10	-.525
40 00	1	517 183.32			77.821 149		1.212 793		-.523

TRANSVERSE MERCATOR PROJECTION
MISSOURI
EAST AND CENTRAL ZONES

Lat.		y_0 feet	Δy_0 per second		H	ΔH per second	v	Δv per second	a
40 00	1	517 183.32	101.182 17		77.821 149	315.45	1.212 793	2.08	-.523
40 01	1	523 254.25	101.182 50		77.802 222	315.55	1.212 918	2.08	-.521
40 02	1	529 325.20	101.182 83		77.783 289	315.66	1.213 043	2.08	-.519
40 03	1	535 396.17	101.183 00		77.764 349	315.78	1.213 168	2.06	-.518
40 04	1	541 467.15	101.183 33		77.745 402	315.88	1.213 292	2.05	-.516
40 05	1	547 538.15	101.183 67		77.726 449	315.98	1.213 415	2.05	-.514
40 06	1	553 609.17	101.184 00		77.707 490	316.11	1.213 539	2.05	-.512
40 07	1	559 680.21	101.184 33		77.688 523	316.20	1.213 661	2.03	-.510
40 08	1	565 751.27	101.184 50		77.669 551	316.33	1.213 783	2.03	-.509
40 09	1	571 822.34	101.184 83		77.650 571	316.43	1.213 905	2.03	-.507
40 10	1	577 893.43	101.185 17		77.631 585	316.55	1.214 027	2.01	-.505
40 11	1	583 964.54	101.185 50		77.612 592	316.65	1.214 148	2.01	-.503
40 12	1	590 035.67	101.185 67		77.593 593	316.76	1.214 269	2.00	-.501
40 13	1	596 106.81	101.186 00		77.574 587	316.86	1.214 389	2.00	-.500
40 14	1	602 177.97	101.186 33		77.555 575	316.98	1.214 509	2.00	-.498
40 15	1	608 249.15	101.186 67		77.536 556	317.10	1.214 629	1.98	-.496
40 16	1	614 320.35	101.187 00		77.517 530	317.20	1.214 748	1.96	-.494
40 17	1	620 391.57	101.187 17		77.498 498	317.31	1.214 866	1.98	-.492
40 18	1	626 462.80	101.187 50		77.479 459	317.41	1.214 985	1.96	-.491
40 19	1	632 534.05	101.187 83		77.460 414	317.53	1.215 103	1.95	-.489
40 20	1	638 605.32	101.188 17		77.441 362	317.65	1.215 220	1.95	-.487
40 21	1	644 676.61	101.188 33		77.422 303	317.75	1.215 337	1.95	-.485
40 22	1	650 747.91	101.188 67		77.403 238	317.86	1.215 454	1.93	-.483
40 23	1	656 819.23	101.189 00		77.384 166	317.96	1.215 570	1.93	-.482
40 24	1	662 890.57	101.189 33		77.365 088	318.08	1.215 686	1.91	-.480
40 25	1	668 961.93	101.189 50		77.346 003	318.20	1.215 801	1.91	-.478
40 26	1	675 033.30	101.190 00		77.326 911	318.30	1.215 916	1.91	-.476
40 27	1	681 104.70	101.190 17		77.307 813	318.40	1.216 031	1.90	-.474
40 28	1	687 176.11	101.190 50		77.288 709	318.51	1.216 145	1.90	-.473
40 29	1	693 247.54	101.190 67		77.269 598	318.63	1.216 259	1.88	-.471
40 30	1	699 318.98	101.191 17		77.250 480	318.73	1.216 372	1.88	-.469
40 31	1	705 390.45	101.191 33		77.231 356	318.85	1.216 485	1.88	-.467
40 32	1	711 461.93	101.191 67		77.212 225	318.95	1.216 598	1.86	-.465
40 33	1	717 533.43	101.191 83		77.193 084	319.06	1.216 710	1.85	-.464
40 34	1	723 604.94	101.192 33		77.173 948	319.16	1.216 821	1.86	-.462
40 35	1	729 676.48	101.192 50		77.154 794	319.28	1.216 933	1.85	-.460
40 36	1	735 748.03	101.192 83		77.135 637	319.40	1.217 044	1.83	-.458
40 37	1	741 819.60	101.193 17		77.116 473	319.50	1.217 154	1.83	-.456
40 38	1	747 891.19	101.193 50		77.097 303	319.61	1.217 264	1.83	-.455
40 39	1	753 962.80	101.193 67		77.078 126	319.71	1.217 374	1.81	-.453
40 40	1	760 034.42	101.194 00		77.058 943	319.83	1.217 483	1.81	-.451
40 41	1	766 106.06	101.194 33		77.039 753	319.93	1.217 592	1.80	-.449
40 42	1	772 177.72	101.194 67		77.020 557	320.06	1.217 700	1.80	-.447
40 43	1	778 249.40	101.194 83		77.001 353	320.15	1.217 808	1.80	-.446
40 44	1	784 321.09	101.195 17		76.982 144	320.26	1.217 916	1.78	-.444
40 45	1	790 392.80	101.195 50		76.962 928	320.38	1.218 023	1.76	-.442
40 46	1	796 464.53	101.195 83		76.943 705	320.48	1.218 129	1.78	-.440
40 47	1	802 536.28	101.196 17		76.924 476	320.60	1.218 236	1.75	-.438
40 48	1	808 608.05	101.196 33		76.905 240	320.70	1.218 341	1.76	-.437
40 49	1	814 679.83	101.196 67		76.885 998	320.81	1.218 447	1.75	-.435
40 50	1	820 751.63	101.197 00		76.866 749	320.91	1.218 552	1.75	-.433
40 51	1	826 823.45	101.197 33		76.847 494	321.03	1.218 657	1.73	-.431
40 52	1	832 895.29	101.197 67		76.828 232	321.15	1.218 761	1.73	-.429
40 53	1	838 967.15	101.197 83		76.808 963	321.25	1.218 865	1.71	-.428
40 54	1	845 039.02	101.198 17		76.789 688	321.35	1.218 968	1.71	-.426
40 55	1	851 110.91	101.198 50		76.770 407	321.48	1.219 071	1.71	-.424
40 56	1	857 182.82	101.198 83		76.751 118	321.56	1.219 174	1.70	-.422
40 57	1	863 254.75	101.199 00		76.731 824	321.68	1.219 276	1.70	-.420
40 58	1	869 326.69	101.199 33		76.712 523	321.80	1.219 378	1.68	-.419
40 59	1	875 398.65	101.199 67		76.693 215	321.90	1.219 479	1.68	-.417
41 00	1	881 470.63			76.673 901		1.219 580		-.415

TRANSVERSE MERCATOR PROJECTION.
MISSOURI
WEST ZONE

Lat.	y. feet	Δy . per second	H	ΔH per second	v	ΔV per second	a
36 10	0	101.116 17	81.9996 152	289.43	1.173 185	3.63	-.960
36 11	6 066.97	101.116 33	81.978 786	289.55	1.173 403	3.63	-.958
36 12	12 133.95	101.116 83	81.961 413	289.66	1.173 621	3.61	-.956
36 13	18 200.96	101.117 00	81.944 033	289.78	1.173 838	3.61	-.954
36 14	24 267.98	101.117 33	81.926 646	289.90	1.174 055	3.61	-.952
36 15	30 335.02	101.117 50	81.909 252	290.01	1.174 272	3.60	-.950
36 16	36 402.07	101.117 83	81.891 851	290.11	1.174 488	3.60	-.948
36 17	42 469.14	101.118 17	81.874 444	290.25	1.174 704	3.58	-.946
36 18	48 536.23	101.118 50	81.857 029	290.35	1.174 919	3.58	-.944
36 19	54 603.34	101.118 87	81.839 608	290.48	1.175 134	3.58	-.942
36 20	60 670.46	101.119 00	81.822 179	290.60	1.175 349	3.56	-.940
36 21	66 737.60	101.119 33	81.804 743	290.70	1.175 563	3.56	-.938
36 22	72 804.76	101.119 50	81.787 301	290.81	1.175 777	3.55	-.936
36 23	78 871.93	101.119 83	81.769 852	290.95	1.175 990	3.55	-.934
36 24	84 939.12	101.120 17	81.752 395	291.05	1.176 203	3.55	-.932
36 25	91 006.33	101.120 50	81.734 932	291.16	1.176 416	3.53	-.930
36 26	97 073.56	101.120 67	81.717 462	291.28	1.176 628	3.53	-.928
36 27	103 140.80	101.121 00	81.699 985	291.40	1.176 840	3.51	-.926
36 28	109 208.06	101.121 33	81.682 501	291.51	1.177 051	3.51	-.924
36 29	115 275.34	101.121 50	81.665 010	291.63	1.177 262	3.51	-.922
36 30	121 342.63	101.121 83	81.647 512	291.75	1.177 473	3.50	-.920
36 31	127 409.94	101.122 17	81.630 007	291.86	1.177 683	3.50	-.918
36 32	133 477.27	101.122 50	81.612 495	291.98	1.177 893	3.50	-.916
36 33	139 544.62	101.122 67	81.594 976	292.08	1.178 103	3.48	-.914
36 34	145 611.98	101.123 00	81.577 451	292.21	1.178 312	3.48	-.912
36 35	151 679.36	101.123 33	81.559 918	292.31	1.178 521	3.46	-.911
36 36	157 746.76	101.123 50	81.542 379	292.45	1.178 729	3.46	-.909
36 37	163 814.17	101.124 00	81.524 832	292.55	1.178 937	3.45	-.907
36 38	169 881.61	101.124 17	81.507 279	292.66	1.179 144	3.45	-.905
36 39	175 949.06	101.124 33	81.489 719	292.78	1.179 351	3.45	-.903
36 40	182 016.52	101.124 83	81.472 152	292.90	1.179 558	3.43	-.901
36 41	188 084.01	101.125 00	81.454 578	293.01	1.179 764	3.43	-.899
36 42	194 151.51	101.125 33	81.436 997	293.11	1.179 970	3.43	-.897
36 43	200 219.03	101.125 50	81.419 410	293.25	1.180 176	3.41	-.895
36 44	206 286.56	101.125 83	81.401 815	293.36	1.180 381	3.41	-.893
36 45	212 354.11	101.126 17	81.384 213	293.46	1.180 586	3.40	-.892
36 46	218 421.68	101.126 50	81.366 605	293.58	1.180 790	3.40	-.890
36 47	224 489.27	101.126 83	81.348 990	293.71	1.180 994	3.38	-.888
36 48	230 556.88	101.127 00	81.331 367	293.81	1.181 197	3.38	-.886
36 49	236 624.50	101.127 33	81.313 738	293.93	1.181 400	3.38	-.884
36 50	242 692.14	101.127 50	81.296 102	294.05	1.181 603	3.36	-.882
36 51	248 759.79	101.127 83	81.278 459	294.16	1.181 805	3.36	-.880
36 52	254 827.46	101.128 17	81.260 809	294.28	1.182 007	3.36	-.878
36 53	260 895.15	101.128 50	81.243 152	294.40	1.182 209	3.35	-.876
36 54	266 962.86	101.128 83	81.225 488	294.51	1.182 410	3.35	-.874
36 55	273 030.59	101.129 00	81.207 817	294.61	1.182 611	3.33	-.873
36 56	279 098.33	101.129 33	81.190 140	294.75	1.182 811	3.33	-.871
36 57	285 166.09	101.129 67	81.172 455	294.85	1.183 011	3.31	-.869
36 58	291 233.87	101.129 83	81.154 764	294.96	1.183 210	3.31	-.867
36 59	297 301.66	101.130 17	81.137 066	295.08	1.183 409	3.31	-.865
37 00	303 369.47		81.119 361		1.183 608		-.863

TRANSVERSE MERCATOR PROJECTION
MISSOURI
WEST ZONE

Lat.	y. feet	Δy , per second	H	ΔH per second	v	Δv per second	a
37 00	303 369.47	101.130 50	81.1119 361	295.20	1.193 608	3.30	-.863
37 01	309 437.30	101.130 83	81.101 649	295.31	1.183 806	3.30	-.861
37 02	315 505.15	101.131 00	81.083 930	295.41	1.184 004	3.30	-.859
37 03	321 573.01	101.131 33	81.066 205	295.55	1.184 202	3.28	-.857
37 04	327 640.89	101.131 67	81.048 472	295.65	1.184 399	3.28	-.855
37 05	333 708.79	101.131 83	81.030 733	295.76	1.184 596	3.26	-.854
37 06	339 776.70	101.132 17	81.012 987	295.88	1.184 792	3.26	-.852
37 07	345 844.63	101.132 50	80.995 234	296.00	1.184 988	3.25	-.850
37 08	351 912.58	101.132 83	80.977 474	296.11	1.185 183	3.25	-.848
37 09	357 980.55	101.133 17	80.959 707	296.23	1.185 378	3.25	-.846
37 10	364 048.54	101.133 33	80.941 933	296.35	1.185 573	3.23	-.844
37 11	370 116.54	101.133 67	80.924 152	296.45	1.185 767	3.23	-.842
37 12	376 184.56	101.133 83	80.906 365	296.56	1.185 961	3.23	-.840
37 13	382 252.59	101.134 17	80.888 571	296.70	1.186 155	3.21	-.838
37 14	388 320.64	101.134 50	80.870 769	296.80	1.186 348	3.20	-.836
37 15	394 388.71	101.134 83	80.852 961	296.91	1.186 540	3.21	-.835
37 16	400 456.80	101.135 17	80.835 146	297.01	1.186 733	3.20	-.833
37 17	406 524.91	101.135 33	80.817 325	297.15	1.186 925	3.18	-.831
37 18	412 593.03	101.135 67	80.799 496	297.26	1.187 116	3.18	-.829
37 19	418 661.17	101.136 00	80.781 660	297.36	1.187 307	3.18	-.827
37 20	424 729.33	101.136 17	80.763 818	297.48	1.187 498	3.16	-.825
37 21	430 797.50	101.136 50	80.745 969	297.60	1.187 688	3.16	-.823
37 22	436 865.69	101.136 83	80.728 113	297.71	1.187 878	3.16	-.821
37 23	442 933.90	101.137 17	80.710 250	297.83	1.188 068	3.15	-.819
37 24	449 002.13	101.137 33	80.692 380	297.95	1.188 257	3.15	-.817
37 25	455 070.37	101.137 67	80.674 503	298.06	1.188 446	3.15	-.816
37 26	461 138.63	101.138 00	80.656 619	298.16	1.188 635	3.13	-.814
37 27	467 206.91	101.138 33	80.638 729	298.28	1.188 823	3.11	-.812
37 28	473 275.21	101.138 50	80.620 832	298.40	1.189 010	3.11	-.810
37 29	479 343.52	101.138 83	80.602 928	298.51	1.189 197	3.11	-.808
37 30	485 411.85	101.139 17	80.585 017	298.63	1.189 384	3.10	-.806
37 31	491 480.20	101.139 50	80.567 099	298.73	1.189 570	3.10	-.804
37 32	497 548.57	101.139 67	80.549 175	298.86	1.189 756	3.10	-.802
37 33	503 616.95	101.140 00	80.531 243	298.96	1.189 942	3.08	-.800
37 34	509 685.35	101.140 33	80.513 305	299.08	1.190 127	3.08	-.798
37 35	515 753.77	101.140 50	80.495 360	299.20	1.190 312	3.06	-.797
37 36	521 822.20	101.140 83	80.477 408	299.31	1.190 496	3.06	-.795
37 37	527 890.65	101.141 17	80.459 449	299.41	1.190 680	3.05	-.793
37 38	533 959.12	101.141 50	80.441 484	299.55	1.190 863	3.05	-.791
37 39	540 027.61	101.141 67	80.423 511	299.65	1.191 046	3.05	-.789
37 40	546 096.11	101.142 00	80.405 532	299.76	1.191 229	3.03	-.787
37 41	552 164.63	101.142 33	80.387 546	299.88	1.191 411	3.03	-.785
37 42	558 233.17	101.142 67	80.369 553	299.98	1.191 593	3.03	-.783
37 43	564 301.73	101.142 83	80.351 554	300.11	1.191 775	3.01	-.781
37 44	570 370.30	101.143 17	80.333 547	300.21	1.191 956	3.01	-.779
37 45	576 438.89	101.143 50	80.315 534	300.33	1.192 137	3.00	-.778
37 46	582 507.50	101.143 83	80.297 514	300.45	1.192 317	3.00	-.776
37 47	588 576.13	101.144 00	80.279 487	300.56	1.192 497	2.98	-.774
37 48	594 644.77	101.144 33	80.261 453	300.68	1.192 676	2.98	-.772
37 49	600 713.43	101.144 67	80.243 412	300.78	1.192 855	2.98	-.770
37 50	606 782.11	101.145 00	80.225 365	300.90	1.193 034	2.96	-.768
37 51	612 850.81	101.145 17	80.207 311	301.03	1.193 212	2.96	-.766
37 52	618 919.52	101.145 50	80.189 249	301.13	1.193 390	2.96	-.764
37 53	624 988.25	101.145 83	80.171 181	301.23	1.193 568	2.95	-.762
37 54	631 057.00	101.146 00	80.153 107	301.36	1.193 745	2.95	-.760
37 55	637 125.76	101.146 50	80.135 025	301.46	1.193 922	2.93	-.759
37 56	643 194.55	101.146 67	80.116 937	301.58	1.194 098	2.93	-.757
37 57	649 263.35	101.146 83	80.098 842	301.70	1.194 274	2.91	-.755
37 58	655 332.16	101.147 33	80.080 740	301.81	1.194 449	2.91	-.753
37 59	661 401.00	101.147 50	80.062 631	301.91	1.194 624	2.91	-.751
38 00	667 469.85		80.044 516		1.194 799		-.749

TRANSVERSE MERCATOR PROJECTION
MISSOURI
WEST ZONE

Lat.	y ₀ feet	Δy ₀ per second	H	ΔH per second	v	Δv per second	a
38 00	667 469.85	101.147 83	80.044 516	302.03	1.194 799	2.90	-.749
38 01	673 538.72	101.148 17	80.026 394	302.15	1.194 973	2.90	-.747
38 02	679 607.61	101.148 33	80.008 265	302.26	1.195 147	2.90	-.745
38 03	685 676.51	101.148 83	79.990 129	302.36	1.195 321	2.88	-.743
38 04	691 745.44	101.149 00	79.971 987	302.50	1.195 494	2.88	-.741
38 05	697 814.38	101.149 17	79.953 837	302.60	1.195 667	2.86	-.740
38 06	703 883.33	101.149 67	79.935 681	302.71	1.195 839	2.86	-.738
38 07	709 952.31	101.149 83	79.917 518	302.81	1.196 011	2.85	-.736
38 08	716 021.30	101.150 17	79.899 349	302.95	1.196 182	2.85	-.734
38 09	722 090.31	101.150 50	79.881 172	303.05	1.196 353	2.85	-.732
38 10	728 159.34	101.150 67	79.862 989	303.16	1.196 524	2.83	-.730
38 11	734 228.38	101.151 00	79.844 799	303.28	1.196 694	2.83	-.728
38 12	740 297.44	101.151 33	79.826 602	303.40	1.196 864	2.81	-.726
38 13	746 366.52	101.151 67	79.808 398	303.50	1.197 033	2.81	-.724
38 14	752 435.62	101.151 83	79.790 188	303.61	1.197 202	2.81	-.722
38 15	758 504.73	101.152 17	79.771 971	303.73	1.197 371	2.80	-.721
38 16	764 573.86	101.152 50	79.753 747	303.85	1.197 539	2.78	-.719
38 17	770 643.01	101.152 83	79.735 516	303.96	1.197 706	2.80	-.717
38 18	776 712.18	101.153 00	79.717 278	304.06	1.197 874	2.78	-.715
38 19	782 781.36	101.153 33	79.699 034	304.18	1.198 041	2.76	-.713
38 20	788 850.56	101.153 67	79.680 783	304.30	1.198 207	2.76	-.711
38 21	794 919.78	101.154 00	79.662 525	304.41	1.198 373	2.76	-.709
38 22	800 989.02	101.154 33	79.644 260	304.51	1.198 539	2.75	-.707
38 23	807 058.28	101.154 50	79.625 989	304.63	1.198 704	2.75	-.705
38 24	813 127.55	101.154 83	79.607 711	304.75	1.198 869	2.75	-.703
38 25	819 196.84	101.155 00	79.589 426	304.86	1.199 034	2.73	-.702
38 26	825 266.14	101.155 50	79.571 134	304.96	1.199 198	2.71	-.700
38 27	831 335.47	101.155 67	79.552 836	305.08	1.199 361	2.73	-.698
38 28	837 404.81	101.156 00	79.534 531	305.20	1.199 525	2.71	-.696
38 29	843 474.17	101.156 17	79.516 219	305.31	1.199 688	2.70	-.694
38 30	849 543.54	101.156 67	79.497 900	305.41	1.199 850	2.70	-.692
38 31	855 612.94	101.156 83	79.479 575	305.53	1.200 012	2.70	-.690
38 32	861 682.35	101.157 17	79.461 243	305.65	1.200 174	2.68	-.688
38 33	867 751.78	101.157 50	79.442 904	305.76	1.200 335	2.68	-.686
38 34	873 821.23	101.157 67	79.424 558	305.86	1.200 496	2.68	-.684
38 35	879 890.69	101.158 00	79.406 206	305.98	1.200 657	2.66	-.683
38 36	885 960.17	101.158 33	79.387 847	306.10	1.200 817	2.65	-.681
38 37	892 029.67	101.158 67	79.369 481	306.21	1.200 976	2.66	-.679
38 38	898 099.19	101.158 83	79.351 108	306.31	1.201 136	2.65	-.677
38 39	904 168.72	101.159 17	79.332 729	306.43	1.201 295	2.63	-.675
38 40	910 238.27	101.159 50	79.314 343	306.55	1.201 453	2.63	-.673
38 41	916 307.84	101.159 83	79.295 950	306.65	1.201 611	2.63	-.671
38 42	922 377.43	101.160 00	79.277 551	306.78	1.201 769	2.61	-.669
38 43	928 447.03	101.160 50	79.259 144	306.88	1.201 926	2.61	-.667
38 44	934 516.66	101.160 67	79.240 731	306.98	1.202 083	2.60	-.665
38 45	940 586.30	101.160 83	79.222 312	307.11	1.202 239	2.60	-.664
38 46	946 655.95	101.161 33	79.203 885	307.21	1.202 395	2.60	-.662
38 47	952 725.63	101.161 50	79.185 452	307.33	1.202 551	2.58	-.660
38 48	958 795.32	101.161 83	79.167 012	307.45	1.202 706	2.58	-.658
38 49	964 865.03	101.162 17	79.148 565	307.55	1.202 861	2.56	-.656
38 50	970 934.76	101.162 33	79.130 112	307.66	1.203 015	2.56	-.654
38 51	977 004.50	101.162 67	79.111 652	307.78	1.203 169	2.55	-.652
38 52	983 074.26	101.163 00	79.093 185	307.90	1.203 322	2.56	-.650
38 53	989 144.04	101.163 33	79.074 711	308.00	1.203 476	2.53	-.648
38 54	995 213.84	101.163 67	79.056 231	308.11	1.203 628	2.55	-.646
38 55	1 001 283.66	101.163 83	79.037 744	308.23	1.203 781	2.53	-.645
38 56	1 007 353.49	101.164 17	79.019 250	308.33	1.203 933	2.51	-.643
38 57	1 013 423.34	101.164 50	79.000 750	308.46	1.204 084	2.51	-.641
38 58	1 019 493.21	101.164 67	78.982 242	308.55	1.204 235	2.51	-.639
38 59	1 025 563.09	101.165 17	78.963 729	308.68	1.204 386	2.50	-.637
39 00	1 031 633.00		78.945 208		1.204 536		-.635

TRANSVERSE MERCATOR PROJECTION
MISSOURI
WEST ZONE

Lat.	y_0 feet	Δy_0 per second	H	ΔH per second	v	Δv per second	a
39 00	1 031 6303.00	101.165 33	78.945 208	308.78	1.204 536	2.50	-.635
39 01	1 037 7033.78	101.165 67	78.926 681	308.90	1.204 886	2.48	-.633
39 02	1 043 7763.46	101.165 83	78.908 147	309.01	1.204 835	2.48	-.631
39 03	1 049 8493.14	101.166 33	78.889 606	309.11	1.204 984	2.48	-.629
39 04	1 055 9222.82	101.166 50	78.871 059	309.23	1.205 133	2.46	-.627
39 05	1 061 9952.50	101.166 67	78.852 505	309.35	1.205 281	2.46	-.626
39 06	1 068 1068.18	101.167 17	78.833 944	309.46	1.205 429	2.45	-.624
39 07	1 074 1184.86	101.167 33	78.815 376	309.56	1.205 576	2.45	-.622
39 08	1 080 1299.54	101.167 67	78.796 802	309.66	1.205 723	2.45	-.620
39 09	1 086 1415.22	101.168 00	78.778 222	309.80	1.205 870	2.43	-.618
39 10	1 092 1530.90	101.168 33	78.759 634	309.90	1.206 016	2.43	-.616
39 11	1 098 1646.58	101.168 50	78.741 040	310.01	1.206 162	2.41	-.614
39 12	1 104 1762.26	101.169 00	78.722 439	310.13	1.206 307	2.41	-.612
39 13	1 110 1877.94	101.169 17	78.703 831	310.23	1.206 452	2.40	-.610
39 14	1 116 1993.62	101.169 33	78.685 217	310.35	1.206 596	2.41	-.608
39 15	1 122 2109.30	101.169 83	78.666 596	310.46	1.206 741	2.38	-.607
39 16	1 128 2224.98	101.170 00	78.647 968	310.56	1.206 884	2.40	-.605
39 17	1 134 2340.66	101.170 33	78.629 334	310.68	1.207 028	2.36	-.603
39 18	1 140 2456.34	101.170 67	78.610 693	310.80	1.207 170	2.38	-.601
39 19	1 146 2572.02	101.170 83	78.592 045	310.90	1.207 313	2.36	-.599
39 20	1 153 2687.70	101.171 17	78.573 391	311.01	1.207 455	2.36	-.597
39 21	1 159 2803.38	101.171 50	78.554 730	311.13	1.207 597	2.35	-.595
39 22	1 165 2919.06	101.171 83	78.536 062	311.23	1.207 738	2.35	-.593
39 23	1 171 3034.74	101.172 17	78.517 388	311.36	1.207 879	2.35	-.591
39 24	1 177 3150.42	101.172 33	78.498 706	311.45	1.208 020	2.33	-.589
39 25	1 183 3266.10	101.172 67	78.480 019	311.58	1.208 160	2.31	-.588
39 26	1 189 3381.78	101.173 00	78.461 324	311.68	1.208 299	2.33	-.586
39 27	1 195 3497.46	101.173 33	78.442 623	311.80	1.208 439	2.31	-.584
39 28	1 201 3613.14	101.173 67	78.423 915	311.90	1.208 578	2.30	-.582
39 29	1 207 3728.82	101.173 83	78.405 201	312.01	1.208 716	2.30	-.580
39 30	1 213 3844.50	101.174 17	78.386 480	312.13	1.208 854	2.30	-.578
39 31	1 219 3960.18	101.174 50	78.367 752	312.23	1.208 992	2.28	-.576
39 32	1 225 4075.86	101.174 83	78.349 018	312.36	1.209 129	2.28	-.574
39 33	1 231 4191.54	101.175 00	78.330 279	312.46	1.209 265	2.28	-.572
39 34	1 238 4307.22	101.175 33	78.311 529	312.56	1.209 402	2.26	-.570
39 35	1 244 4422.90	101.175 67	78.292 775	312.68	1.209 538	2.25	-.569
39 36	1 250 4538.58	101.176 00	78.274 014	312.78	1.209 673	2.25	-.567
39 37	1 256 4654.26	101.176 33	78.255 250	312.89	1.209 808	2.25	-.565
39 38	1 262 4769.94	101.176 67	78.236 482	312.99	1.209 943	2.23	-.563
39 39	1 268 4885.62	101.176 83	78.217 717	313.13	1.210 077	2.23	-.561
39 40	1 274 5001.30	101.177 00	78.198 940	313.23	1.210 211	2.23	-.559
39 41	1 280 5116.98	101.177 33	78.180 110	313.35	1.210 345	2.21	-.557
39 42	1 286 5232.66	101.177 67	78.161 309	313.46	1.210 478	2.21	-.555
39 43	1 292 5348.34	101.178 00	78.142 501	313.56	1.210 611	2.20	-.553
39 44	1 298 5464.02	101.178 17	78.123 687	313.68	1.210 743	2.20	-.552
39 45	1 304 5579.70	101.178 33	78.104 866	313.78	1.210 875	2.18	-.550
39 46	1 310 5695.38	101.178 50	78.086 039	313.90	1.211 006	2.18	-.548
39 47	1 316 5811.06	101.179 17	78.067 205	314.01	1.211 137	2.18	-.546
39 48	1 323 5926.74	101.179 33	78.048 364	314.11	1.211 268	2.16	-.544
39 49	1 329 6042.42	101.179 83	78.029 517	314.23	1.211 398	2.16	-.543
39 50	1 335 6158.10	101.180 00	78.010 663	314.35	1.211 528	2.15	-.541
39 51	1 341 6273.78	101.180 33	77.991 802	314.45	1.211 657	2.15	-.539
39 52	1 347 6389.46	101.180 67	77.972 935	314.56	1.211 786	2.15	-.537
39 53	1 353 6505.14	101.181 00	77.954 061	314.66	1.211 915	2.13	-.535
39 54	1 359 6620.82	101.181 17	77.935 181	314.78	1.212 043	2.13	-.534
39 55	1 365 6736.50	101.181 50	77.916 294	314.90	1.212 171	2.11	-.532
39 56	1 371 6852.18	101.181 83	77.897 400	315.00	1.212 298	2.11	-.530
39 57	1 377 6967.86	101.182 00	77.878 500	315.11	1.212 425	2.10	-.528
39 58	1 383 7083.54	101.182 33	77.859 593	315.23	1.212 551	2.10	-.527
39 59	1 389 7199.22	101.182 57	77.840 679	315.33	1.212 677	2.10	-.525
40 00	1 395 7314.90		77.821 759		1.212 803		-.523

TRANSVERSE MERCATOR PROJECTION
MISSOURI
WEST ZONE

Lat.	Y. feet	Δy . per second	H	ΔH per second	V	ΔV per second	a
40 00	1 395 859.43	101.183 00	77.821 759	315.45	1.212 803	2.08	-.523
40 01	1 401 930.41	101.183 33	77.802 832	315.55	1.212 928	2.08	-.521
40 02	1 408 001.41	101.183 50	77.783 899	315.66	1.213 053	2.08	-.519
40 03	1 414 072.42	101.183 83	77.764 959	315.78	1.213 178	2.06	-.518
40 04	1 420 143.45	101.184 17	77.746 012	315.88	1.213 302	2.05	-.516
40 05	1 426 214.50	101.184 50	77.727 059	316.00	1.213 425	2.05	-.514
40 06	1 432 285.57	101.184 83	77.708 099	316.10	1.213 548	2.05	-.512
40 07	1 438 356.66	101.185 00	77.689 133	316.21	1.213 671	2.03	-.510
40 08	1 444 427.76	101.185 33	77.670 160	316.33	1.213 793	2.03	-.509
40 09	1 450 498.88	101.185 67	77.651 180	316.43	1.213 915	2.03	-.507
40 10	1 456 570.02	101.186 00	77.632 194	316.55	1.214 037	2.01	-.505
40 11	1 462 641.18	101.186 17	77.613 201	316.65	1.214 158	2.01	-.503
40 12	1 468 712.35	101.186 50	77.594 202	316.76	1.214 279	2.00	-.501
40 13	1 474 783.54	101.186 83	77.575 196	316.88	1.214 399	2.00	-.500
40 14	1 480 854.75	101.187 17	77.556 183	316.98	1.214 519	2.00	-.498
40 15	1 486 925.98	101.187 50	77.537 164	317.10	1.214 639	1.98	-.496
40 16	1 492 997.23	101.187 67	77.518 138	317.20	1.214 758	1.96	-.494
40 17	1 499 068.49	101.188 00	77.499 106	317.31	1.214 876	1.98	-.492
40 18	1 505 139.77	101.188 33	77.480 067	317.43	1.214 995	1.96	-.491
40 19	1 511 211.07	101.188 67	77.461 021	317.53	1.215 113	1.95	-.489
40 20	1 517 282.39	101.188 83	77.441 969	317.65	1.215 230	1.95	-.487
40 21	1 523 353.72	101.189 17	77.422 910	317.75	1.215 347	1.95	-.485
40 22	1 529 425.07	101.189 50	77.403 845	317.86	1.215 464	1.93	-.483
40 23	1 535 496.44	101.189 83	77.384 773	317.96	1.215 580	1.93	-.482
40 24	1 541 567.83	101.190 00	77.365 695	318.08	1.215 696	1.91	-.480
40 25	1 547 639.23	101.190 50	77.346 610	318.20	1.215 811	1.91	-.478
40 26	1 553 710.66	101.190 67	77.327 518	318.30	1.215 926	1.91	-.476
40 27	1 559 782.10	101.190 83	77.308 420	318.41	1.216 041	1.90	-.474
40 28	1 565 853.55	101.191 33	77.289 315	318.51	1.216 155	1.90	-.473
40 29	1 571 925.03	101.191 50	77.270 204	318.63	1.216 269	1.88	-.471
40 30	1 577 996.52	101.191 83	77.251 086	318.73	1.216 382	1.88	-.469
40 31	1 584 068.03	101.192 17	77.231 962	318.85	1.216 495	1.88	-.467
40 32	1 590 139.56	101.192 50	77.212 831	318.96	1.216 608	1.86	-.465
40 33	1 596 211.11	101.192 83	77.193 693	319.06	1.216 720	1.85	-.464
40 34	1 602 282.68	101.193 00	77.174 549	319.16	1.216 831	1.85	-.462
40 35	1 608 354.26	101.193 33	77.155 399	319.30	1.216 943	1.85	-.460
40 36	1 614 425.86	101.193 67	77.136 241	319.38	1.217 054	1.83	-.458
40 37	1 620 497.48	101.193 83	77.117 078	319.51	1.217 164	1.83	-.456
40 38	1 626 569.11	101.194 33	77.097 907	319.61	1.217 274	1.83	-.455
40 39	1 632 640.77	101.194 50	77.078 730	319.71	1.217 384	1.81	-.453
40 40	1 638 712.44	101.194 83	77.059 547	319.83	1.217 493	1.81	-.451
40 41	1 644 784.13	101.195 00	77.040 357	319.95	1.217 602	1.80	-.449
40 42	1 650 855.83	101.195 50	77.021 160	320.05	1.217 710	1.80	-.447
40 43	1 656 927.56	101.195 67	77.001 957	320.15	1.217 818	1.80	-.446
40 44	1 662 999.30	101.195 83	76.982 748	320.28	1.217 926	1.78	-.444
40 45	1 669 071.06	101.196 33	76.963 531	320.36	1.218 033	1.76	-.442
40 46	1 675 142.84	101.196 67	76.944 309	320.50	1.218 139	1.78	-.440
40 47	1 681 214.64	101.196 83	76.925 079	320.60	1.218 246	1.75	-.438
40 48	1 687 286.45	101.197 17	76.905 843	320.70	1.218 351	1.76	-.437
40 49	1 693 358.28	101.197 50	76.886 601	320.81	1.218 457	1.75	-.435
40 50	1 699 430.13		76.867 352		1.218 562		-.433

TRANSVERSE MERCATOR PROJECTION

MISSOURI

All Zones

$\Delta \lambda''$	b	Δb	c	$\Delta \lambda''$	b	Δb	c
0	0.000	+0.235	0.000				
100	+0.235	+0.235	0.000	3100	+4.255	-0.069	-0.133
200	+0.470	+0.233	-0.001	3200	+4.186	-0.090	-0.135
300	+0.703	+0.232	-0.002	3300	+4.096	-0.109	-0.136
400	+0.935	+0.229	-0.003	3400	+3.987	-0.130	-0.135
500	+1.164	+0.225	-0.005	3500	+3.857	-0.152	-0.133
600	+1.389	+0.222	-0.007	3600	+3.705	-0.174	-0.131
700	+1.611	+0.218	-0.010	3700	+3.531	-0.196	-0.128
800	+1.829	+0.213	-0.014	3800	+3.335	-0.219	-0.124
900	+2.042	+0.207	-0.018	3900	+3.116	-0.243	-0.120
1000	+2.249	+0.200	-0.022	4000	+2.873	-0.265	-0.115
1100	+2.449	+0.194	-0.027	4100	+2.608	-0.292	-0.109
1200	+2.643	+0.186	-0.032	4200	+2.316	-0.317	-0.101
1300	+2.829	+0.179	-0.038	4300	+1.999	-0.344	-0.091
1400	+3.008	+0.171	-0.043	4400	+1.655	-0.374	-0.078
1500	+3.179	+0.162	-0.049	4500	+1.281	-0.397	-0.063
1600	+3.341	+0.152	-0.055	4600	+0.884	-0.427	-0.045
1700	+3.493	+0.142	-0.061	4700	+0.457	-0.457	-0.025
1800	+3.635	+0.131	-0.067	4800	0.000	-0.486	0.000
1900	+3.766	+0.119	-0.073	4900	-0.486	-0.516	+0.026
2000	+3.885	+0.109	-0.079	5000	-1.002	-0.545	+0.053
2100	+3.994	+0.095	-0.085	5100	-1.547	-0.577	+0.084
2200	+4.089	+0.082	-0.091	5200	-2.124	-0.608	+0.117
2300	+4.171	+0.067	-0.096	5300	-2.732	-0.641	+0.153
2400	+4.238	+0.052	-0.101	5400	-3.373	-0.673	+0.191
2500	+4.290	+0.037	-0.106	5500	-4.046	-0.707	+0.232
2600	+4.327	+0.021	-0.111	5600	-4.753	-0.742	+0.275
2700	+4.348	+0.003	-0.116	5700	-5.495	-0.776	+0.321
2800	+4.351	-0.013	-0.121	5800	-6.271	-0.811	+0.371
2900	+4.338	-0.032	-0.125	5900	-7.082	-0.848	+0.426
3000	+4.306	-0.051	-0.130	6000	-7.930		+0.487

TRANSVERSE MERCATOR PROJECTION

TABLE FOR g

$$\Delta\alpha'' = \sin \phi (\Delta\lambda'') + g$$

Latitude	$\Delta\lambda''$						
	0''	1000''	2000''	3000''	4000''	5000''	6000''
24°	0:00	0:00	0:02	0:07	0:17	0:33	0:58
25	0	0	0.02	0.07	0.17	0.34	0.59
26°	0.00	0.00	0.02	0.08	0.18	0.35	0.60
27	0	0	0.02	0.08	0.18	0.35	0.61
28	0	0	0.02	0.08	0.18	0.36	0.62
29	0	0	0.02	0.08	0.19	0.37	0.63
30	0	0	0.02	0.08	0.19	0.37	0.64
31°	0.00	0.00	0.02	0.08	0.19	0.37	0.64
32	0	0	0.02	0.08	0.19	0.38	0.65
33	0	0	0.02	0.08	0.19	0.38	0.65
34	0	0	0.02	0.08	0.19	0.38	0.65
35	0	0	0.02	0.08	0.19	0.38	0.65
36°	0.00	0.00	0.02	0.08	0.19	0.38	0.65
37	0	0	0.02	0.08	0.19	0.38	0.65
38	0	0	0.02	0.08	0.19	0.38	0.65
39	0	0	0.02	0.08	0.19	0.37	0.64
40	0	0	0.02	0.08	0.19	0.37	0.64
41°	0.00	0.00	0.02	0.08	0.19	0.37	0.63
42	0	0	0.02	0.08	0.18	0.36	0.63
43	0	0	0.02	0.08	0.18	0.36	0.62
44	0	0	0.02	0.08	0.18	0.35	0.61
45	0	0	0.02	0.08	0.18	0.35	0.60
46°	0.00	0.00	0.02	0.07	0.17	0.34	0.59
47	0	0	0.02	0.07	0.17	0.33	0.58
48	0	0	0.02	0.07	0.17	0.33	0.56
49	0	0	0.02	0.07	0.16	0.32	0.55
50	0.00	0.00	0.02	0.07	0.16	0.31	0.54

$$g = \left[\frac{C (\sin 1'') \cos^3 \phi}{2A^2} + F \right] (\Delta\lambda'')^3$$

A, C and F are position factors.

Y CORRECTION FOR COMPUTATION OF GEOGRAPHIC
POSITIONS FROM PLANE COORDINATES
TRANSVERSE MERCATOR PROJECTION, MISSOURI-EAST & CENTRAL ZONES

$$P(x/10,000)^2 + d = V(\Delta/100)^2 + c$$

P taken out for y-coordinate
d taken out for x'

y	P	ΔP	x'	d
0	1.72330	1744	0	0.00
100,000	1.74074	1757	50,000	+ 0.01
200,000	1.75831	1768	100,000	+ 0.02
300,000	1.77599	1782	150,000	+ 0.04
400,000	1.79381	1794	200,000	+ 0.06
500,000	1.81175	1807	250,000	+ 0.08
600,000	1.82982	1820	300,000	+ 0.08
700,000	1.84802	1834	350,000	+ 0.04
800,000	1.86636	1848	400,000	- 0.03
900,000	1.88484	1861	420,000	- 0.07
1,000,000	1.90345	1876		
1,100,000	1.92221	1890		
1,200,000	1.94111	1904		
1,300,000	1.96015	1920		
1,400,000	1.97935	1934		
1,500,000	1.99869	1950		
1,600,000	2.01819	1966		
1,700,000	2.03785	1981		
1,800,000	2.05766			

Y CORRECTION FOR COMPUTATION OF GEOGRAPHIC
POSITIONS FROM PLANE COORDINATES
TRANSVERSE MERCATOR PROJECTION, MISSOURI-WEST ZONE

$$P(x'/10,000)^2 + d = V(\Delta y/100)^2 + c$$

P taken out for y-coordinate
d taken out for x'

y	P	ΔP	x'	d
0	1.74451	1759	0	0.00
100,000	1.76210	1771	50,000	0.00
200,000	1.77981	1784	100,000	+ 0.02
300,000	1.79765	1797	150,000	+ 0.03
400,000	1.81562	1810	200,000	+ 0.04
500,000	1.83372	1823	250,000	+ 0.05
600,000	1.85195	1837	300,000	+ 0.04
700,000	1.87032	1851	350,000	- 0.02
800,000	1.88883	1864	400,000	- 0.11
900,000	1.90747	1879	420,000	- 0.16
1,000,000	1.92626	1892		
1,100,000	1.94518	1908		
1,200,000	1.96426	1922		
1,300,000	1.98348	1938		
1,400,000	2.00286	1954		
1,500,000	2.02240	1968		
1,600,000	2.04208			

TRANSVERSE MERCATOR PROJECTION

Missouri

$$\Delta\alpha = Mx' - e$$

y	East and central zones		West zone	
	M	ΔM	M	ΔM
0	0.007 1098	719	0.007 1971	726
100,000	0.007 1817	725	0.007 2697	731
200,000	0.007 2542	730	0.007 3428	736
300,000	0.007 3272	735	0.007 4164	741
400,000	0.007 4007	740	0.007 4905	747
500,000	0.007 4747	746	0.007 5652	752
600,000	0.007 5493	751	0.007 6404	758
700,000	0.007 6244	757	0.007 7162	763
800,000	0.007 7001	762	0.007 7925	770
900,000	0.007 7763	768	0.007 8695	775
1,000,000	0.007 8531	773	0.007 9470	781
1,100,000	0.007 9304	780	0.008 0251	787
1,200,000	0.008 0084	786	0.008 1038	793
1,300,000	0.008 0870	792	0.008 1831	800
1,400,000	0.008 1662	798	0.008 2631	806
1,500,000	0.008 2460	805	0.008 3437	812
1,600,000	0.008 3265	811	0.008 4249	819
1,700,000	0.008 4076	818	0.008 5068	
1,800,000	0.008 4894	824		
1,900,000	0.008 5718			

e

y \ x'	East and central zones			West zone		
	200,000	300,000	400,000	200,000	300,000	400,000
0	0.0	0.2	0.5	0.0	0.2	0.4
500,000	0.0	0.2	0.5	0.0	0.2	0.5
1,000,000	0.0	0.2	0.6	0.0	0.2	0.6
1,500,000	0.0	0.2	0.6	0.1	0.3	0.7
2,000,000	0.0	0.2	0.6			

TRANSVERSE MERCATOR PROJECTION
MISSOURI
East and Central Zones

x' (feet)	Scale in units of 7th place of logs	Scale ex- pressed as a ratio	x' (feet)	Scale in units of 7th place of logs	Scale ex- pressed as a ratio
0	-289.5	0.9999333	175,000	-137.4	0.9999684
5,000	-289.4	0.9999334	180,000	-128.6	0.9999704
10,000	-289.0	0.9999335	185,000	-119.5	0.9999725
15,000	-288.4	0.9999336	190,000	-110.2	0.9999746
20,000	-287.5	0.9999338	195,000	-100.6	0.9999768
25,000	-286.4	0.9999341	200,000	- 90.8	0.9999791
30,000	-285.0	0.9999344	205,000	- 80.8	0.9999814
35,000	-283.4	0.9999347	210,000	- 70.5	0.9999838
40,000	-281.6	0.9999352	215,000	- 59.9	0.9999862
45,000	-279.5	0.9999356	220,000	- 49.1	0.9999887
50,000	-277.1	0.9999362	225,000	- 38.1	0.9999912
55,000	-274.5	0.9999368	230,000	- 26.8	0.9999938
60,000	-271.6	0.9999375	235,000	- 15.2	0.9999965
65,000	-268.5	0.9999382	240,000	- 3.4	0.9999992
70,000	-265.2	0.9999389	245,000	+ 8.6	1.0000020
75,000	-261.6	0.9999398	250,000	+ 20.9	1.0000048
80,000	-257.7	0.9999407	255,000	+ 33.5	1.0000077
85,000	-253.6	0.9999416	260,000	+ 46.3	1.0000107
90,000	-249.3	0.9999426	265,000	+ 59.3	1.0000137
95,000	-244.7	0.9999437	270,000	+ 72.6	1.0000167
100,000	-239.8	0.9999448	275,000	+ 86.1	1.0000198
105,000	-234.7	0.9999460	280,000	+ 99.9	1.0000230
110,000	-229.4	0.9999472	285,000	+113.9	1.0000262
115,000	-223.8	0.9999485	290,000	+128.2	1.0000295
120,000	-218.0	0.9999498	295,000	+142.7	1.0000329
125,000	-211.9	0.9999512	300,000	+157.5	1.0000363
130,000	-205.6	0.9999527	305,000	+172.5	1.0000397
135,000	-199.0	0.9999542	310,000	+187.8	1.0000432
140,000	-192.2	0.9999557	315,000	+203.3	1.0000468
145,000	-185.1	0.9999574	320,000	+219.1	1.0000504
150,000	-177.8	0.9999591	325,000	+235.1	1.0000541
155,000	-170.2	0.9999608	330,000	+251.4	1.0000579
160,000	-162.4	0.9999626	335,000	+267.9	1.0000617
165,000	-154.3	0.9999645	340,000	+284.7	1.0000656
170,000	-146.0	0.9999664	345,000	+301.7	1.0000695

TRANSVERSE MERCATOR PROJECTION
MISSOURI
East and Central Zones

x' (feet)	Scale in Units of 7th place of logs	Scale ex- pressed as a ratio
350,000	+318.9	1.0000734
355,000	+336.4	1.0000775
360,000	+354.2	1.0000816
365,000	+372.2	1.0000857
370,000	+390.5	1.0000899
375,000	+409.0	1.0000942
380,000	+427.7	1.0000985
385,000	+446.7	1.0001029
390,000	+465.9	1.0001073
395,000	+485.4	1.0001118
400,000	+505.2	1.0001163
405,000	+525.2	1.0001209
410,000	+545.4	1.0001256
415,000	+565.9	1.0001303
420,000	+586.6	1.0001351
425,000	+607.6	1.0001399
430,000	+628.9	1.0001448
435,000	+650.4	1.0001498
440,000	+672.1	1.0001548
445,000	+694.1	1.0001598
450,000	+716.3	1.0001649
455,000	+738.7	1.0001701
460,000	+761.5	1.0001753
465,000	+784.4	1.0001806
470,000	+807.6	1.0001860
475,000	+831.1	1.0001914

TRANSVERSE MERCATOR PROJECTION
MISSOURI
West Zone

x' (feet)	Scale in units of 7th place of logs.	Scale expres- sed as a ratio	x' (feet)	Scale in units of 7th place of logs.	Scale ex- pressed as a ratio.
0	-255.5	0.9999412	175,000	-103.4	0.9999762
5,000	-255.4	0.9999412	180,000	- 94.6	0.9999782
10,000	-255.0	0.9999413	185,000	- 85.5	0.9999803
15,000	-254.4	0.9999414	190,000	- 76.2	0.9999825
20,000	-253.5	0.9999416	195,000	- 66.6	0.9999847
25,000	-252.4	0.9999419	200,000	- 56.8	0.9999869
30,000	-251.0	0.9999422	205,000	- 46.8	0.9999892
35,000	-249.4	0.9999426	210,000	- 36.5	0.9999916
40,000	-247.6	0.9999430	215,000	- 25.9	0.9999940
45,000	-245.5	0.9999435	220,000	- 15.1	0.9999965
50,000	-243.1	0.9999440	225,000	- 4.1	0.9999991
55,000	-240.5	0.9999446	230,000	+ 7.2	1.0000017
60,000	-237.6	0.9999453	235,000	+ 18.8	1.0000043
65,000	-234.5	0.9999460	240,000	+ 30.6	1.0000070
70,000	-231.2	0.9999468	245,000	+ 42.6	1.0000098
75,000	-227.6	0.9999476	250,000	+ 54.9	1.0000126
80,000	-223.7	0.9999485	255,000	+ 67.5	1.0000155
85,000	-219.6	0.9999494	260,000	+ 80.3	1.0000185
90,000	-215.3	0.9999504	265,000	+ 93.3	1.0000215
95,000	-210.7	0.9999515	270,000	+106.6	1.0000245
100,000	-205.8	0.9999526	275,000	+120.1	1.0000277
105,000	-200.7	0.9999538	280,000	+133.9	1.0000308
110,000	-195.4	0.9999550	285,000	+147.9	1.0000341
115,000	-189.8	0.9999563	290,000	+162.2	1.0000373
120,000	-184.0	0.9999576	295,000	+176.7	1.0000407
125,000	-177.9	0.9999590	300,000	+191.5	1.0000441
130,000	-171.6	0.9999605	305,000	+206.5	1.0000475
135,000	-165.0	0.9999620	310,000	+221.8	1.0000511
140,000	-158.2	0.9999636	315,000	+237.3	1.0000546
145,000	-151.1	0.9999652	320,000	+253.1	1.0000583
150,000	-143.8	0.9999669	325,000	+269.1	1.0000620
155,000	-136.2	0.9999686	330,000	+285.4	1.0000657
160,000	-128.4	0.9999704	335,000	+301.9	1.0000695
165,000	-120.3	0.9999723	340,000	+318.7	1.0000734
170,000	-112.0	0.9999742	345,000	+335.7	1.0000773

TRANSVERSE MERCATOR PROJECTION
MISSOURI
West Zone

x' (feet)	Scale in units of 7th place of logs.	Scale express- ed as a ratio
350,000	+352.9	1.0000813
355,000	+370.4	1.0000853
360,000	+388.2	1.0000894
365,000	+406.2	1.0000935
370,000	+424.5	1.0000977
375,000	+443.0	1.0001020
380,000	+461.7	1.0001063
385,000	+480.7	1.0001107
390,000	+499.9	1.0001151
395,000	+519.4	1.0001196
400,00	+539.2	1.0001242
405,000	+559.2	1.0001288
410,000	+579.4	1.0001334
415,000	+599.9	1.0001381
420,000	+620.6	1.0001429

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

For Lambert Projection				For Lambert or transverse Mercator Projection			
<u>$\Delta\phi'$ a s a r g u m e n t</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.