

TABLE 7

**MAPPING COORDINATES FOR THE UMBRAL PATH  
TOTAL SOLAR ECLIPSE OF 2009 JULY 22**

$\Delta T = 65.9 \text{ s}$

Longitude	Latitude of:			Circumstances on Central Line				
	Northern Limit	Southern Limit	Central Line	Universal Time h m s	Sun Alt °	Sun Az. °	Path Width km	Central Durat.
072°00.0'E	21°55.30'N	19°54.78'N	20°54.80'N	00:52:53	1.5	68.8	206.9	03m12.7s
073°00.0'E	22°17.65'N	20°16.67'N	21°16.92'N	00:52:57	2.5	69.2	207.9	03m15.1s
074°00.0'E	22°39.77'N	20°38.34'N	21°38.81'N	00:53:03	3.5	69.6	208.9	03m17.6s
075°00.0'E	23°01.65'N	20°59.78'N	22°00.48'N	00:53:11	4.6	70.0	209.9	03m20.1s
076°00.0'E	23°23.29'N	21°20.99'N	22°21.90'N	00:53:21	5.6	70.3	210.9	03m22.6s
077°00.0'E	23°44.66'N	21°41.95'N	22°43.07'N	00:53:33	6.6	70.7	211.8	03m25.2s
078°00.0'E	24°05.76'N	22°02.65'N	23°03.97'N	00:53:46	7.7	71.2	212.8	03m27.8s
079°00.0'E	24°26.57'N	22°23.07'N	23°24.59'N	00:54:02	8.7	71.6	213.8	03m30.5s
080°00.0'E	24°47.08'N	22°43.20'N	23°44.91'N	00:54:20	9.7	72.0	214.8	03m33.2s
081°00.0'E	25°07.27'N	23°03.04'N	24°04.93'N	00:54:40	10.8	72.5	215.7	03m36.0s
082°00.0'E	25°27.14'N	23°22.56'N	24°24.63'N	00:55:03	11.8	72.9	216.7	03m38.8s
083°00.0'E	25°46.67'N	23°41.75'N	24°44.00'N	00:55:27	12.9	73.4	217.7	03m41.6s
084°00.0'E	26°05.85'N	24°00.61'N	25°03.02'N	00:55:53	13.9	73.8	218.6	03m44.5s
085°00.0'E	26°24.66'N	24°19.11'N	25°21.68'N	00:56:22	15.0	74.3	219.6	03m47.5s
086°00.0'E	26°43.10'N	24°37.25'N	25°39.97'N	00:56:53	16.1	74.8	220.5	03m50.4s
087°00.0'E	27°01.14'N	24°55.01'N	25°57.88'N	00:57:25	17.1	75.3	221.4	03m53.5s
088°00.0'E	27°18.78'N	25°12.37'N	26°15.39'N	00:58:00	18.2	75.8	222.3	03m56.5s
089°00.0'E	27°36.00'N	25°29.33'N	26°32.48'N	00:58:38	19.3	76.4	223.3	03m59.6s
090°00.0'E	27°52.79'N	25°45.87'N	26°49.15'N	00:59:17	20.3	76.9	224.2	04m02.8s
091°00.0'E	28°09.13'N	26°01.98'N	27°05.38'N	00:59:59	21.4	77.4	225.1	04m06.0s
092°00.0'E	28°25.02'N	26°17.64'N	27°21.16'N	01:00:42	22.5	78.0	226.0	04m09.2s
093°00.0'E	28°40.44'N	26°32.84'N	27°36.48'N	01:01:28	23.6	78.6	226.9	04m12.5s
094°00.0'E	28°55.38'N	26°47.57'N	27°51.31'N	01:02:16	24.7	79.1	227.7	04m15.8s
095°00.0'E	29°09.82'N	27°01.81'N	28°05.66'N	01:03:07	25.8	79.7	228.6	04m19.2s
096°00.0'E	29°23.75'N	27°15.54'N	28°19.50'N	01:03:59	26.9	80.3	229.5	04m22.5s
097°00.0'E	29°37.16'N	27°28.76'N	28°32.82'N	01:04:54	28.0	80.9	230.3	04m26.0s
098°00.0'E	29°50.03'N	27°41.45'N	28°45.61'N	01:05:51	29.1	81.5	231.2	04m29.4s
099°00.0'E	30°02.36'N	27°53.60'N	28°57.85'N	01:06:51	30.2	82.2	232.0	04m32.9s
100°00.0'E	30°14.13'N	28°05.19'N	29°09.53'N	01:07:52	31.3	82.8	232.9	04m36.5s
101°00.0'E	30°25.32'N	28°16.20'N	29°20.64'N	01:08:56	32.4	83.5	233.7	04m40.0s
102°00.0'E	30°35.93'N	28°26.63'N	29°31.17'N	01:10:02	33.5	84.1	234.5	04m43.6s
103°00.0'E	30°45.94'N	28°36.46'N	29°41.09'N	01:11:10	34.7	84.8	235.4	04m47.2s
104°00.0'E	30°55.33'N	28°45.67'N	29°50.40'N	01:12:21	35.8	85.5	236.2	04m50.8s
105°00.0'E	31°04.10'N	28°54.26'N	29°59.08'N	01:13:34	36.9	86.2	237.0	04m54.5s
106°00.0'E	31°12.23'N	29°02.20'N	30°07.13'N	01:14:49	38.1	86.9	237.8	04m58.2s
107°00.0'E	31°19.71'N	29°09.47'N	30°14.51'N	01:16:07	39.2	87.6	238.6	05m01.9s
108°00.0'E	31°26.52'N	29°16.08'N	30°21.22'N	01:17:27	40.4	88.3	239.4	05m05.6s
109°00.0'E	31°32.66'N	29°21.99'N	30°27.25'N	01:18:49	41.6	89.1	240.1	05m09.3s
110°00.0'E	31°38.09'N	29°27.19'N	30°32.58'N	01:20:14	42.7	89.8	240.9	05m13.0s
111°00.0'E	31°42.82'N	29°31.67'N	30°37.19'N	01:21:41	43.9	90.6	241.7	05m16.8s
112°00.0'E	31°46.83'N	29°35.41'N	30°41.06'N	01:23:10	45.1	91.4	242.4	05m20.5s
113°00.0'E	31°50.10'N	29°38.39'N	30°44.19'N	01:24:42	46.3	92.2	243.2	05m24.2s
114°00.0'E	31°52.61'N	29°40.59'N	30°46.56'N	01:26:17	47.5	93.0	243.9	05m28.0s
115°00.0'E	31°54.35'N	29°42.01'N	30°48.14'N	01:27:53	48.7	93.8	244.6	05m31.7s
116°00.0'E	31°55.31'N	29°42.61'N	30°48.93'N	01:29:33	49.9	94.7	245.4	05m35.4s
117°00.0'E	31°55.47'N	29°42.38'N	30°48.90'N	01:31:15	51.1	95.5	246.1	05m39.0s
118°00.0'E	31°54.80'N	29°41.30'N	30°48.03'N	01:32:59	52.3	96.4	246.8	05m42.7s
119°00.0'E	31°53.30'N	29°39.35'N	30°46.31'N	01:34:46	53.5	97.3	247.5	05m46.3s

TABLE 7 – CONTINUED

MAPPING COORDINATES FOR THE UMBRAL PATH  
TOTAL SOLAR ECLIPSE OF 2009 JULY 22

$\Delta T = 65.9$  s

Longitude	Latitude of:			Circumstances on Central Line				
	Northern Limit	Southern Limit	Central Line	Universal Time h m s	Sun Alt °	Sun Az. °	Path Width km	Central Durat.
120°00.0'E	31°50.94'N	29°36.50'N	30°43.71'N	01:36:36	54.8	98.2	248.1	05m49.9s
121°00.0'E	31°47.70'N	29°32.75'N	30°40.22'N	01:38:28	56.0	99.2	248.8	05m53.4s
122°00.0'E	31°43.57'N	29°28.06'N	30°35.82'N	01:40:23	57.3	100.1	249.5	05m56.9s
123°00.0'E	31°38.52'N	29°22.41'N	30°30.47'N	01:42:21	58.6	101.1	250.1	06m00.3s
124°00.0'E	31°32.53'N	29°15.77'N	30°24.17'N	01:44:21	59.9	102.2	250.7	06m03.6s
125°00.0'E	31°25.58'N	29°08.13'N	30°16.88'N	01:46:25	61.2	103.2	251.3	06m06.9s
126°00.0'E	31°17.65'N	28°59.46'N	30°08.59'N	01:48:31	62.5	104.3	251.9	06m10.0s
127°00.0'E	31°08.71'N	28°49.73'N	29°59.26'N	01:50:40	63.8	105.5	252.5	06m13.1s
128°00.0'E	30°58.74'N	28°38.91'N	29°48.88'N	01:52:52	65.2	106.7	253.1	06m16.1s
129°00.0'E	30°47.72'N	28°26.99'N	29°37.41'N	01:55:07	66.5	108.0	253.6	06m18.9s
130°00.0'E	30°35.61'N	28°13.92'N	29°24.83'N	01:57:25	67.9	109.3	254.1	06m21.6s
131°00.0'E	30°22.39'N	27°59.68'N	29°11.11'N	01:59:46	69.3	110.8	254.6	06m24.2s
132°00.0'E	30°08.04'N	27°44.25'N	28°56.23'N	02:02:10	70.7	112.3	255.1	06m26.6s
133°00.0'E	29°52.53'N	27°27.59'N	28°40.15'N	02:04:37	72.1	114.0	255.5	06m28.8s
134°00.0'E	29°35.82'N	27°09.67'N	28°22.85'N	02:07:07	73.5	115.9	255.9	06m30.9s
135°00.0'E	29°17.90'N	26°50.48'N	28°04.30'N	02:09:41	74.9	118.0	256.3	06m32.8s
136°00.0'E	28°58.73'N	26°29.97'N	27°44.47'N	02:12:17	76.3	120.4	256.7	06m34.5s
137°00.0'E	28°38.28'N	26°08.13'N	27°23.33'N	02:14:57	77.8	123.3	257.0	06m35.9s
138°00.0'E	28°16.53'N	25°44.92'N	27°00.86'N	02:17:39	79.2	126.7	257.3	06m37.1s
139°00.0'E	27°53.46'N	25°20.33'N	26°37.03'N	02:20:25	80.6	131.1	257.6	06m38.1s
140°00.0'E	27°29.03'N	24°54.34'N	26°11.83'N	02:23:14	82.0	136.8	257.8	06m38.8s
141°00.0'E	27°03.24'N	24°26.92'N	25°45.23'N	02:26:06	83.3	144.7	258.0	06m39.3s
142°00.0'E	26°36.05'N	23°58.07'N	25°17.21'N	02:29:00	84.5	156.1	258.2	06m39.4s
143°00.0'E	26°07.45'N	23°27.78'N	24°47.77'N	02:31:57	85.4	172.6	258.3	06m39.3s
144°00.0'E	25°37.43'N	22°56.04'N	24°16.89'N	02:34:57	85.9	194.8	258.4	06m38.9s
145°00.0'E	25°05.98'N	22°22.86'N	23°44.57'N	02:38:00	85.6	218.1	258.5	06m38.2s
146°00.0'E	24°33.11'N	21°48.26'N	23°10.82'N	02:41:04	84.8	236.9	258.6	06m37.1s
147°00.0'E	23°58.81'N	21°12.24'N	22°35.65'N	02:44:11	83.6	250.0	258.6	06m35.8s
148°00.0'E	23°23.10'N	20°34.85'N	21°59.09'N	02:47:19	82.1	258.9	258.5	06m34.1s
149°00.0'E	22°46.00'N	19°56.11'N	21°21.15'N	02:50:29	80.6	265.2	258.5	06m32.1s
150°00.0'E	22°07.54'N	19°16.09'N	20°41.89'N	02:53:40	78.9	269.8	258.4	06m29.8s
151°00.0'E	21°27.76'N	18°34.83'N	20°01.35'N	02:56:52	77.2	273.4	258.3	06m27.2s
152°00.0'E	20°46.72'N	17°52.41'N	19°19.59'N	03:00:04	75.5	276.3	258.1	06m24.3s
153°00.0'E	20°04.47'N	17°08.92'N	18°36.69'N	03:03:15	73.7	278.7	257.9	06m21.1s
154°00.0'E	19°21.09'N	16°24.44'N	17°52.72'N	03:06:27	71.9	280.6	257.7	06m17.7s
155°00.0'E	18°36.66'N	15°39.07'N	17°07.78'N	03:09:37	70.1	282.3	257.5	06m14.0s
156°00.0'E	17°51.27'N	14°52.93'N	16°21.97'N	03:12:45	68.2	283.8	257.2	06m10.0s
157°00.0'E	17°05.02'N	14°06.12'N	15°35.39'N	03:15:52	66.4	285.0	256.8	06m05.8s
158°00.0'E	16°18.02'N	13°18.75'N	14°48.17'N	03:18:56	64.5	286.2	256.4	06m01.5s
159°00.0'E	15°30.39'N	12°30.97'N	14°00.42'N	03:21:57	62.7	287.1	256.0	05m56.9s
160°00.0'E	14°42.25'N	11°42.87'N	13°12.25'N	03:24:55	60.8	288.0	255.5	05m52.3s
161°00.0'E	13°53.72'N	10°54.59'N	12°23.80'N	03:27:49	59.0	288.8	255.0	05m47.5s
162°00.0'E	13°04.91'N	10°06.24'N	11°35.18'N	03:30:39	57.1	289.5	254.4	05m42.6s
163°00.0'E	12°15.95'N	09°17.94'N	10°46.51'N	03:33:24	55.3	290.1	253.7	05m37.6s
164°00.0'E	11°26.96'N	08°29.78'N	09°57.90'N	03:36:04	53.5	290.7	253.0	05m32.6s
165°00.0'E	10°38.05'N	07°41.87'N	09°09.46'N	03:38:39	51.7	291.2	252.3	05m27.5s
166°00.0'E	09°49.32'N	06°54.29'N	08°21.28'N	03:41:09	49.9	291.6	251.5	05m22.4s
167°00.0'E	09°00.87'N	06°07.13'N	07°33.46'N	03:43:33	48.1	292.0	250.6	05m17.4s
168°00.0'E	08°12.79'N	05°20.47'N	06°46.07'N	03:45:52	46.4	292.4	249.7	05m12.3s
169°00.0'E	07°25.17'N	04°34.37'N	05°59.19'N	03:48:05	44.6	292.7	248.7	05m07.3s

**TABLE 7 – CONTINUED**  
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**TOTAL SOLAR ECLIPSE OF 2009 JULY 22**

$\Delta T = 65.9 \text{ s}$

Longitude	Latitude of:			Circumstances on Central Line				
	Northern Limit	Southern Limit	Central Line	Universal Time h m s	Sun Alt °	Sun Az. °	Path Width km	Central Durat.
170°00.0'E	06°38.07'N	03°48.88'N	05°12.89'N	03:50:12	42.9	293.0	247.7	05m02.4s
171°00.0'E	05°51.56'N	03°04.05'N	04°27.21'N	03:52:13	41.3	293.2	246.6	04m57.5s
172°00.0'E	05°05.69'N	02°19.92'N	03°42.21'N	03:54:09	39.6	293.4	245.5	04m52.7s
173°00.0'E	04°20.52'N	01°36.54'N	02°57.93'N	03:56:00	38.0	293.5	244.3	04m47.9s
174°00.0'E	03°36.08'N	00°53.91'N	02°14.40'N	03:57:44	36.4	293.7	243.1	04m43.3s
175°00.0'E	02°52.40'N	00°12.07'N	01°31.65'N	03:59:23	34.8	293.8	241.8	04m38.7s
176°00.0'E	02°09.50'N	00°28.97'S	00°49.69'N	04:00:57	33.2	293.9	240.6	04m34.2s
177°00.0'E	01°27.42'N	01°09.20'S	00°08.54'N	04:02:26	31.7	293.9	239.3	04m29.8s
178°00.0'E	00°46.16'N	01°48.61'S	00°31.79'S	04:03:49	30.2	294.0	237.9	04m25.5s
179°00.0'E	00°05.73'N	02°27.20'S	01°11.29'S	04:05:07	28.7	294.0	236.6	04m21.3s
180°00.0'E	00°33.87'S	03°04.97'S	01°49.96'S	04:06:21	27.3	294.0	235.2	04m17.3s
179°00.0'W	01°12.62'S	03°41.92'S	02°27.80'S	04:07:30	25.8	293.9	233.8	04m13.3s
178°00.0'W	01°50.54'S	04°18.06'S	03°04.82'S	04:08:35	24.4	293.9	232.4	04m09.4s
177°00.0'W	02°27.63'S	04°53.40'S	03°41.01'S	04:09:35	23.0	293.9	231.0	04m05.6s
176°00.0'W	03°03.88'S	05°27.94'S	04°16.40'S	04:10:31	21.7	293.8	229.6	04m01.9s
175°00.0'W	03°39.32'S	06°01.69'S	04°50.97'S	04:11:22	20.3	293.7	228.2	03m58.3s
174°00.0'W	04°13.94'S	06°34.66'S	05°24.76'S	04:12:10	19.0	293.6	226.7	03m54.7s
173°00.0'W	04°47.77'S	07°06.87'S	05°57.76'S	04:12:54	17.7	293.5	225.3	03m51.3s
172°00.0'W	05°20.80'S	07°38.32'S	06°29.99'S	04:13:35	16.4	293.4	223.9	03m48.0s
171°00.0'W	05°53.06'S	08°09.04'S	07°01.47'S	04:14:12	15.2	293.3	222.5	03m44.7s
170°00.0'W	06°24.56'S	08°39.03'S	07°32.20'S	04:14:46	13.9	293.1	221.1	03m41.6s
169°00.0'W	06°55.31'S	09°08.30'S	08°02.19'S	04:15:16	12.7	293.0	219.7	03m38.5s
168°00.0'W	07°25.32'S	09°36.87'S	08°31.47'S	04:15:43	11.5	292.8	218.3	03m35.5s
167°00.0'W	07°54.60'S	10°04.76'S	09°00.05'S	04:16:07	10.3	292.6	216.9	03m32.6s
166°00.0'W	08°23.18'S	10°31.97'S	09°27.93'S	04:16:29	9.1	292.5	215.5	03m29.7s
165°00.0'W	08°51.07'S	10°58.53'S	09°55.14'S	04:16:47	8.0	292.3	214.2	03m27.0s
164°00.0'W	09°18.27'S	11°24.43'S	10°21.68'S	04:17:03	6.9	292.1	212.8	03m24.3s
163°00.0'W	09°44.80'S	11°49.70'S	10°47.57'S	04:17:16	5.7	291.9	211.5	03m21.6s
162°00.0'W	10°10.68'S	12°14.35'S	11°12.82'S	04:17:27	4.6	291.7	210.2	03m19.1s
161°00.0'W	10°35.92'S	12°38.39'S	11°37.45'S	04:17:35	3.5	291.5	208.9	03m16.6s
160°00.0'W	11°00.54'S	13°01.83'S	12°01.47'S	04:17:42	2.4	291.3	207.6	03m14.1s
159°00.0'W	11°24.53'S	13°24.69'S	12°24.89'S	04:17:45	1.4	291.1	206.3	03m11.7s