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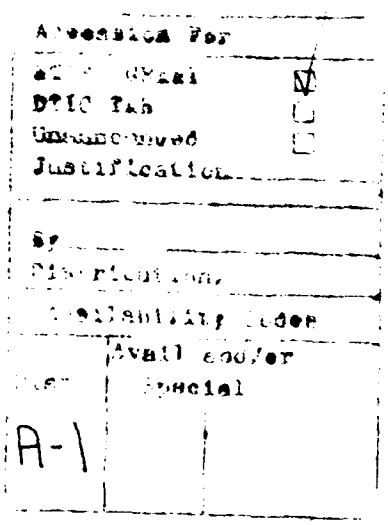
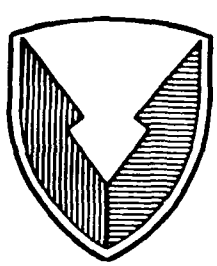
A MANUAL METHOD FOR DETERMINING THE FRACTIONAL STABILITY CATEGORY

April 1991



Ricardo Peña



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ATMOSPHERIC SCIENCES LABORATORY
White Sands Missile Range, NM 88002-5501

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13. ABSTRACT *(Maximum 200 words)*

A simplistic manual method has been developed for determining the atmospheric stability based on FSCAT, a computer code that calculates the fractional stability category. The FSCAT algorithm retains the simplicity of the well-known Pasquill stability category scheme, and it also allows a much finer semicontinuous resolution of the stability of the surface boundary layer. The manual method allows the user to obtain the same results as with FSCAT, using cloud, wind, and solar angle data with a "decision tree" method, to determine the insolation class number, the net radiation index, and the fractional stability category. This practical method can be a useful tool for field operations where use of computers may not be possible.

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1. INTRODUCTION

The determination of the atmospheric stability in the surface boundary layer is essential for tactical operations using smoke or other chemical agents in the battlefield. Several methods have been devised to predict atmospheric stability, the most widely used being the Pasquill (1961) approach. Recently, FSCAT (an acronym for fractional stability category), a computer code that calculates atmospheric stability (Peña and DeSutter, 1990), has been developed by the U.S. Army Atmospheric Sciences Laboratory. FSCAT retains the simplicity of the Pasquill scheme and also allows a much finer semicontinuous resolution of the stability of the lower atmosphere.

While the Pasquill method uses a letter system (A through G), FSCAT uses a semicontinuous number scheme that ranges from -3.75 for a very unstable atmosphere to +3.25 for very stable, with 0 being the neutral condition, as shown in table 1.* This numerical scheme yields values in good agreement with other methods, including Smith's (1979) and Pasquill's (1961).

This report deals with a manual method for determining the atmospheric stability, based on FSCAT, but totally independent of any computer knowledge or operation.

2. CALCULATION OF THE SOLAR ELEVATION ANGLE

The solar elevation angle is an important factor in determining the amount of solar energy that reaches the earth's surface. The amount of insolation is also related to the atmospheric stability. Two methods for calculating the solar elevation angle are those described by Woolf (1968) and Ludwig (1970). Peña (1985) made a comparative study of these two methods and determined their results to be very similar, except at sunrise or sunset times, when the Woolf approach would yield a more accurate solution.

However, for our purposes, the Ludwig method was chosen due to its simplicity and validity for all latitudes. Using this method, one can derive the solar elevation angle, S (in radians) from the following expression:

$$\sin S = \sin D \sin LO + \cos\left[\frac{(H1 - 12)2\pi}{24}\right] \cos D \cos LO \quad , \qquad (1)$$

where H1 is the local standard time (LST), with 24 being midnight. The solar declination angle D is estimated from

$$\tan D = - \tan (23.4438)\pi/180 \cos\left[\frac{2\pi\ (JO + 9)}{365}\right] \quad . \qquad (2)$$

The terms LO and JO are station latitude and Julian date, respectively (see tables 2 and 3).

*Tables and figure are presented at the end of the text.

Equations (1) and (2) are used in a computer program, SOLANG, to produce solar elevation angles in the tables given in appendices A through L for 20, 30, 40, 50, and 60 degrees north latitudes and Julian dates (JDATE) of 001 to 366. These are given for LSTs of 0600 to 1800.

3. MANUAL PROCEDURE

The following five easy steps can be used to determine the fractional stability category (FSC). Also, figure 1 provides a "decision tree" outline as an aid for determining FSC.

STEP 1: Determine the solar elevation angle, S.

Look up the Julian date from table 2 (perpetual) or table 3 (leap year) calendars. From appendices A through L determine S for the Julian date, local time, and approximate latitude.

STEP 2: Determine solar insolation class number (ICN)

Using knowledge of solar elevation angle, ground condition, and snow cover determine the ICN from table 4.

STEP 3: Determine the net radiation index (NRI)

Set or modify the NRI value according to the diagram in figure 1, depending on day or nighttime conditions. The "N/2" cases are considered as nighttime, even though the solar angle may be greater than 6 degrees.

STEP 4: Determine windspeed class (A or B)

If windspeed is between 0 and 8 m/s, windspeed class is A. If windspeed is $\geq$8 m/s, windspeed class is B.

STEP 5: Determine the fractional stability category (FSC)

Using windspeed and NRI values, determine FSC from table 5 for class A wind. For class B wind, use NRI values in table 6 to determine FSC.

4. CONCLUSION

The manual method for determining the FSC is a practical and useful tool for estimating the atmospheric stability of the lower atmosphere. It can be used in field operations where use of computers may not be possible or practical.

TABLE 1. RELATIONSHIP BETWEEN THE PASQUILL AND FSCAT SCHEMES

Pasquill Category	FSCAT	Pasquill Category	FSCAT
	-3.75		0.25
	-3.50		0.50
	-3.25		0.75
A	-3.00	E	1.00
	-2.75		1.25
	-2.50		1.50
	-2.25		1.75
B	-2.00	F	2.00
	-1.75		2.25
	-1.50		2.50
	-1.25		2.75
C	-1.00	G	3.00
	-0.75		3.25
	-0.50		
	-0.25		
D	0.0		

TABLE 2. JULIAN DATE CALENDAR (PERPETUAL)

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Day
1	001	032	060	091	121	152	182	213	244	274	305	335	1
2	002	033	061	092	122	153	183	214	245	275	306	336	2
3	003	034	062	093	123	154	184	215	246	276	307	337	3
4	004	035	063	094	124	155	185	216	247	277	308	338	4
5	005	036	064	095	125	156	186	217	248	278	309	339	5
6	006	037	065	096	126	157	187	218	249	279	310	340	6
7	007	038	066	097	127	158	188	219	250	280	311	341	7
8	008	039	067	098	128	159	189	220	251	281	312	342	8
9	009	040	068	099	129	160	190	221	252	282	313	343	9
10	010	041	069	100	130	161	191	222	253	283	314	344	10
11	011	042	070	101	131	162	192	223	254	284	315	345	11
12	012	043	071	102	132	163	193	224	255	285	316	346	12
13	013	044	072	103	133	164	194	225	256	286	317	347	13
14	014	045	073	104	134	165	195	226	257	287	318	348	14
15	015	046	074	105	135	166	196	227	258	288	319	349	15
16	016	047	075	106	136	167	197	228	259	289	320	350	16
17	017	048	076	107	137	168	198	229	260	290	321	351	17
18	018	049	077	108	138	169	199	230	261	291	322	352	18
19	019	050	078	109	139	170	200	231	262	292	323	353	19
20	020	051	079	110	140	171	201	232	263	293	324	354	20
21	021	052	080	111	141	172	202	233	264	294	325	355	21
22	022	053	081	112	142	173	203	234	265	295	326	356	22
23	023	054	082	113	143	174	204	235	266	296	327	357	23
24	024	055	083	114	144	175	205	236	267	297	328	358	24
25	025	056	084	115	145	176	206	237	268	298	329	359	25
26	026	057	085	116	146	177	207	238	269	299	330	360	26
27	027	058	086	117	147	178	208	239	270	300	331	361	27
28	028	059	087	118	148	179	209	240	271	301	332	362	28
29	029		088	119	149	180	210	241	272	302	333	363	29
30	030		089	120	150	181	211	242	273	303	334	364	30
31	031		090		151		212	243		304		365	31

TABLE 3. JULIAN DATE CALENDAR (LEAP YEARS ONLY)

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Day
1	001	032	061	092	122	153	183	214	245	275	306	336	1
2	002	033	062	093	123	154	184	215	246	276	307	337	2
3	003	034	063	094	124	155	185	216	247	277	308	338	3
4	004	035	064	095	125	156	186	217	248	278	309	339	4
5	005	036	065	096	126	157	187	218	249	279	310	340	5
6	006	037	066	097	127	158	188	219	250	280	311	341	6
7	007	038	067	098	128	159	189	220	251	281	312	342	7
8	008	039	068	099	129	160	190	221	252	282	313	343	8
9	009	040	069	100	130	161	191	222	253	283	314	344	9
10	010	041	070	101	131	162	192	223	254	284	315	345	10
11	011	042	071	102	132	163	193	224	255	285	316	346	11
12	012	043	072	103	133	164	194	225	256	286	317	347	12
13	013	044	073	104	134	165	195	226	257	287	318	348	13
14	014	045	074	105	135	166	196	227	258	288	319	349	14
15	015	046	075	106	136	167	197	228	259	289	320	350	15
16	016	047	076	107	137	168	198	229	260	290	321	351	16
17	017	048	077	108	138	169	199	230	261	291	322	352	17
18	018	049	078	109	139	170	200	231	262	292	323	353	18
19	019	050	079	110	140	171	201	232	263	293	324	354	19
20	020	051	080	111	141	172	202	233	264	294	325	355	20
21	021	052	081	112	142	173	203	234	265	295	326	356	21
22	022	053	082	113	143	174	204	235	266	296	327	357	22
23	023	054	083	114	144	175	205	236	267	297	328	358	23
24	024	055	084	115	145	176	206	237	268	298	329	359	24
25	025	056	085	116	146	177	207	238	269	299	330	360	25
26	026	057	086	117	147	178	208	239	270	300	331	361	26
27	027	058	087	118	148	179	209	240	271	301	332	362	27
28	028	059	088	119	149	180	210	241	272	302	333	363	28
29	029	060	089	120	150	181	211	242	273	303	334	364	29
30	030		090	121	151	182	212	243	274	304	335	365	30
31	031		091		152		213	244		305		366	31

TABLE 4. INSOLATION CLASS NUMBERS (ICN)

Solar Elevation Angle, S (deg.)	Bare Ground	Snow patchy < 6 in. deep	Snow cover 6 in. or more
$S \geq 60$	+4	+4	+4
$60 > S \geq 35$	+3	+3	+2
$35 > S \geq 21$	+2	+2	+2
$21 > S \geq 18$	+2	+2	+1
$18 > S \geq 15$	+2	+1	N/2*
$15 > S \geq 12$	+1	N/2*	Night
$12 > S \geq 6$	N/2*	Night	Night
$6 > S$	Night	Night	Night

*Divide NRI value by 2

TABLE 5. FRACTIONAL STABILITY CLASS (FSC) FOR WINDSPEED CLASS A (< 8 m/s)

NRI = 4		NRI = 3		NRI = 2		NRI = 1	
WS	FSC	WS	FSC	WS	FSC	WS	FSC
0.	-3.5	0.	-3.0	0.	-2.5	0.	-2.0
1.	-3.25	1.	-2.75	1.	-2.25	1.	-1.75
2.	-3.0	2.	-2.5	2.	-2.0	2.	-1.5
3.	-2.75	3.	-2.25	3.	-1.75	3.	-1.25
4.	-2.5	4.	-2.0	4.	-1.5	4.	-1.0
5.	-2.25	5.	-1.75	5.	-1.25	5.	-0.75
6.	-2.0	6.	-1.5	6.	-1.0	6.	-0.5
7.	-1.75	7.	-1.25	7.	-0.75	7.	-0.25
7.5	-1.63	7.5	-1.13	7.5	-0.38	7.5	-0.13

NRI = 0	NRI = -1		NRI = -2		NPI = -3	
FSC = 0	WS	FSC	WS	FSC	WS	FSC
	0.	2.0	0.	2.5	0.	3.0
	1.	1.75	1.	2.25	1.	2.75
	2.	1.50	2.	2.0	2.	2.50
	3.	1.25	3.	1.75	3.	2.25
	4.	1.0	4.	1.50	4.	2.0
	5.	0.75	5.	1.25	5.	1.75
	6.	0.50	6.	1.0	6.	1.50
	7.	0.25	7.	0.75	7.	1.25
	7.5	0.13	7.5	0.63	7.5	1.13

TABLE 6. FRACTIONAL STABILITY CLASS (FSC) FOR WINDSPEED CLASS B ($\geq$ 8 m/s)

NRI	FSC	NRI	FSC	NRI	FSC
4.0	2.0	1.5	0.75	-1.0	-0.50
3.5	1.75	1.0	0.50	-1.5	-0.75
3.0	1.50	0.5	0.25	-2.0	-1.00
2.5	1.25	0.0	0.00	-2.5	-1.25
2.0	1.00	-0.5	-0.25	-3.0	-1.50

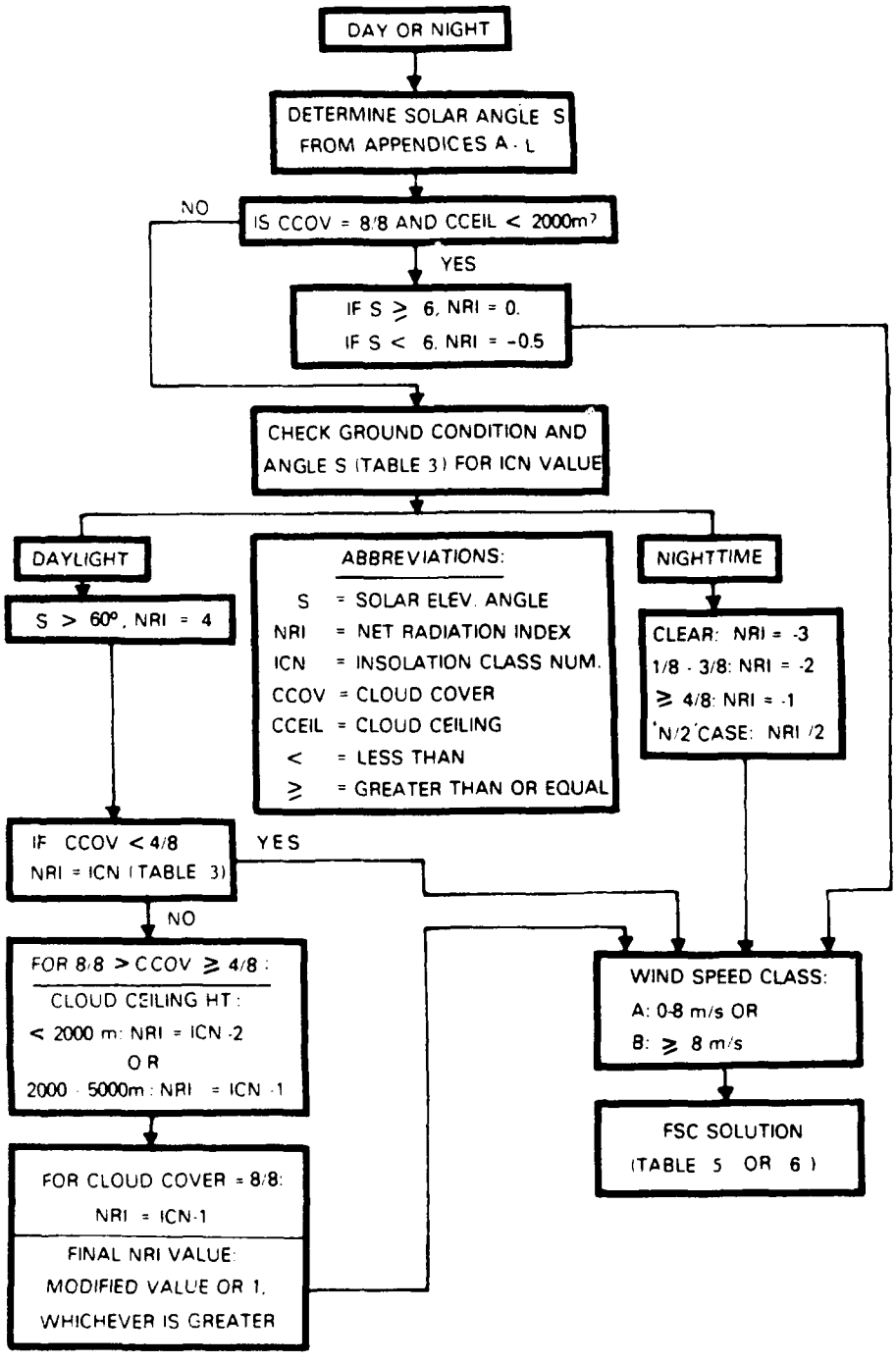

Figure 1. Determination of Fractional Stability Category (FSC).

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APPENDIX A

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 001 TO 031

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 001 TO 031

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
001	-7.7	5.1	17.3	28.5	37.9	44.5	46.9	44.5	37.9	28.5	17.3	5.1	-7.7
002	-7.7	5.1	17.4	28.5	37.9	44.5	46.9	44.5	37.9	28.5	17.4	5.1	-7.7
003	-7.7	5.2	17.4	28.6	38.0	44.6	47.0	44.6	38.0	28.6	17.4	5.2	-7.7
004	-7.7	5.2	17.4	28.6	38.0	44.7	47.1	44.7	38.0	28.6	17.4	5.2	-7.7
005	-7.6	5.2	17.5	28.7	38.1	44.7	47.2	44.7	38.1	28.7	17.5	5.2	-7.6
006	-7.6	5.3	17.5	28.7	38.2	44.8	47.3	44.8	38.2	28.7	17.5	5.3	-7.6
007	-7.6	5.3	17.6	28.8	38.3	44.9	47.3	44.9	38.3	28.8	17.6	5.3	-7.6
008	-7.5	5.4	17.6	28.8	38.3	45.0	47.5	45.0	38.3	28.8	17.6	5.4	-7.5
009	-7.5	5.4	17.7	28.9	38.4	45.1	47.6	45.1	38.4	28.9	17.7	5.4	-7.5
010	-7.5	5.5	17.7	29.0	38.5	45.2	47.7	45.2	38.5	29.0	17.7	5.5	-7.5
011	-7.4	5.5	17.8	29.1	38.6	45.3	47.8	45.3	38.6	29.1	17.8	5.5	-7.4
012	-7.4	5.6	17.9	29.2	38.7	45.4	47.9	45.4	38.7	29.2	17.9	5.6	-7.4
013	-7.3	5.6	17.9	29.2	38.8	45.6	48.1	45.6	38.8	29.2	17.9	5.6	-7.3
014	-7.3	5.7	18.0	29.3	38.9	45.7	48.2	45.7	38.9	29.3	18.0	5.7	-7.3
015	-7.3	5.7	18.1	29.4	39.1	45.8	48.3	45.8	39.1	29.4	18.1	5.7	-7.3
016	-7.2	5.8	18.2	29.5	39.2	46.0	48.5	46.0	39.2	29.5	18.2	5.8	-7.2
017	-7.2	5.9	18.2	29.6	39.3	46.1	48.6	46.1	39.3	29.6	18.2	5.9	-7.2
018	-7.1	5.9	18.3	29.7	39.4	46.3	48.8	46.3	39.4	29.7	18.3	5.9	-7.1
019	-7.0	6.0	18.4	29.8	39.6	46.4	49.0	46.4	39.6	29.8	18.4	6.0	-7.0
020	-7.0	6.1	18.5	30.0	39.7	46.6	49.2	46.6	39.7	30.0	18.5	6.1	-7.0
021	-6.9	6.1	18.6	30.1	39.8	46.8	49.3	46.8	39.8	30.1	18.6	6.1	-6.9
022	-6.9	6.2	18.7	30.2	40.0	46.9	49.5	46.9	40.0	30.2	18.7	6.2	-6.9
023	-6.8	6.3	18.8	30.3	40.2	47.1	49.7	47.1	40.2	30.3	18.8	6.3	-6.8
024	-6.7	6.4	18.9	30.4	40.3	47.3	49.9	47.3	40.3	30.4	18.9	6.4	-6.7
025	-6.7	6.5	19.0	30.6	40.5	47.5	50.1	47.5	40.5	30.6	19.0	6.5	-6.7
026	-6.6	6.5	19.1	30.7	40.6	47.7	50.3	47.7	40.6	30.7	19.1	6.5	-6.6
027	-6.5	6.6	19.2	30.8	40.8	47.9	50.6	47.9	40.8	30.8	19.2	6.6	-6.5
028	-6.5	6.7	19.3	31.0	41.0	48.1	50.8	48.1	41.0	31.0	19.3	6.7	-6.5
029	-6.4	6.8	19.4	31.1	41.2	48.3	51.0	48.3	41.2	31.1	19.4	6.8	-6.4
030	-6.3	6.9	19.6	31.3	41.3	48.5	51.2	48.5	41.3	31.3	19.6	6.9	-6.3
031	-6.2	7.0	19.7	31.4	41.5	48.8	51.5	48.8	41.5	31.4	19.7	7.0	-6.2

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 001 TO 031

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
001	-11.3	0.6	11.6	21.5	29.6	34.9	36.9	34.9	29.6	21.5	11.6	0.6	-11.3
002	-11.3	0.6	11.7	21.6	29.6	35.0	36.9	35.0	29.6	21.6	11.7	0.6	-11.3
003	-11.3	0.6	11.7	21.6	29.7	35.1	37.0	35.1	29.7	21.6	11.7	0.6	-11.3
004	-11.2	0.7	11.8	21.7	29.7	35.2	37.1	35.2	29.7	21.7	11.8	0.7	-11.2
005	-11.2	0.7	11.8	21.7	29.8	35.2	37.2	35.2	29.8	21.7	11.8	0.7	-11.2
006	-11.1	0.8	11.9	21.8	29.9	35.3	37.3	35.3	29.9	21.8	11.9	0.8	-11.1
007	-11.1	0.8	11.9	21.9	30.0	35.4	37.3	35.4	30.0	21.9	11.9	0.8	-11.1
008	-11.1	0.9	12.0	22.0	30.1	35.5	37.5	35.5	30.1	22.0	12.0	0.9	-11.1
009	-11.0	0.9	12.1	22.0	30.2	35.6	37.6	35.6	30.2	22.0	12.1	0.9	-11.0
010	-10.9	1.0	12.2	22.1	30.3	35.7	37.7	35.7	30.3	22.1	12.2	1.0	-10.9
011	-10.9	1.1	12.2	22.2	30.4	35.8	37.8	35.8	30.4	22.2	12.2	1.1	-10.9
012	-10.8	1.1	12.3	22.3	30.5	36.0	37.9	36.0	30.5	22.3	12.3	1.1	-10.8
013	-10.8	1.2	12.4	22.4	30.6	36.1	38.1	36.1	30.6	22.4	12.4	1.2	-10.8
014	-10.7	1.3	12.5	22.5	30.7	36.2	38.2	36.2	30.7	22.5	12.5	1.3	-10.7
015	-10.6	1.4	12.6	22.6	30.8	36.4	38.3	36.4	30.8	22.6	12.6	1.4	-10.6
016	-10.6	1.4	12.7	22.7	31.0	36.5	38.5	36.5	31.0	22.7	12.7	1.4	-10.6
017	-10.5	1.5	12.8	22.8	31.1	36.7	38.6	36.7	31.1	22.8	12.8	1.5	-10.5
018	-10.4	1.6	12.9	23.0	31.2	36.8	38.8	36.8	31.2	23.0	12.9	1.6	-10.4
019	-10.3	1.7	13.0	23.1	31.4	37.0	39.0	37.0	31.4	23.1	13.0	1.7	-10.3
020	-10.2	1.8	13.1	23.2	31.5	37.1	39.2	37.1	31.5	23.2	13.1	1.8	-10.2
021	-10.2	1.9	13.2	23.4	31.7	37.3	39.3	37.3	31.7	23.4	13.2	1.9	-10.2
022	-10.1	2.0	13.3	23.5	31.9	37.5	39.5	37.5	31.9	23.5	13.3	2.0	-10.1
023	-10.0	2.1	13.5	23.6	32.0	37.7	39.7	37.7	32.0	23.6	13.5	2.1	-10.0
024	-9.9	2.2	13.6	23.8	32.2	37.9	39.9	37.9	32.2	23.8	13.6	2.2	-9.9
025	-9.8	2.3	13.7	23.9	32.4	38.1	40.1	38.1	32.4	23.9	13.7	2.3	-9.8
026	-9.7	2.5	13.9	24.1	32.6	38.3	40.3	38.3	32.6	24.1	13.9	2.5	-9.7
027	-9.6	2.6	14.0	24.3	32.7	38.5	40.6	38.5	32.7	24.3	14.0	2.6	-9.6
028	-9.5	2.7	14.1	24.4	32.9	38.7	40.8	38.7	32.9	24.4	14.1	2.7	-9.5
029	-9.4	2.8	14.3	24.6	33.1	38.9	41.0	38.9	33.1	24.6	14.3	2.8	-9.4
030	-9.3	3.0	14.4	24.8	33.3	39.1	41.2	39.1	33.3	24.8	14.4	3.0	-9.3
031	-9.1	3.1	14.6	25.0	33.5	39.4	41.5	39.4	33.5	25.0	14.6	3.1	-9.1

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 001 TO 031

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
001	-14.6	-4.0	5.7	14.2	20.9	25.3	26.9	25.3	20.9	14.2	5.7	-4.0	-14.6
002	-14.6	-4.0	5.8	14.3	21.0	25.4	26.9	25.4	21.0	14.3	5.8	-4.0	-14.6
003	-14.5	-3.9	5.8	14.3	21.1	25.5	27.0	25.5	21.1	14.3	5.8	-3.9	-14.5
004	-14.5	-3.9	5.9	14.4	21.1	25.5	27.1	25.5	21.1	14.4	5.9	-3.9	-14.5
005	-14.4	-3.8	5.9	14.5	21.2	25.6	27.2	25.6	21.2	14.5	5.9	-3.8	-14.4
006	-14.4	-3.8	6.0	14.5	21.3	25.7	27.3	25.7	21.3	14.5	6.0	-3.8	-14.4
007	-14.3	-3.7	6.1	14.6	21.4	25.8	27.3	25.8	21.4	14.6	6.1	-3.7	-14.3
008	-14.3	-3.6	6.2	14.7	21.5	25.9	27.5	25.9	21.5	14.7	6.2	-3.6	-14.3
009	-14.2	-3.6	6.2	14.8	21.6	26.0	27.6	26.0	21.6	14.8	6.2	-3.6	-14.2
010	-14.1	-3.5	6.3	14.9	21.7	26.1	27.7	26.1	21.7	14.9	6.3	-3.5	-14.1
011	-14.1	-3.4	6.4	15.0	21.8	26.2	27.8	26.2	21.8	15.0	6.4	-3.4	-14.1
012	-14.0	-3.3	6.5	15.1	21.9	26.4	27.9	26.4	21.9	15.1	6.5	-3.3	-14.0
013	-13.9	-3.2	6.6	15.2	22.0	26.5	28.1	26.5	22.0	15.2	6.6	-3.2	-13.9
014	-13.8	-3.1	6.7	15.3	22.2	26.6	28.2	26.6	22.2	15.3	6.7	-3.1	-13.8
015	-13.7	-3.0	6.8	15.4	22.3	26.8	28.3	26.8	22.3	15.4	6.8	-3.0	-13.7
016	-13.6	-2.9	6.9	15.6	22.4	26.9	28.5	26.9	22.4	15.6	6.9	-2.9	-13.6
017	-13.5	-2.8	7.0	15.7	22.6	27.1	28.6	27.1	22.6	15.7	7.0	-2.8	-13.5
018	-13.4	-2.7	7.2	15.8	22.7	27.2	28.8	27.2	22.7	15.8	7.2	-2.7	-13.4
019	-13.3	-2.6	7.3	16.0	22.9	27.4	29.0	27.4	22.9	16.0	7.3	-2.6	-13.3
020	-13.2	-2.5	7.4	16.1	23.0	27.6	29.2	27.6	23.0	16.1	7.4	-2.5	-13.2
021	-13.1	-2.4	7.6	16.3	23.2	27.7	29.3	27.7	23.2	16.3	7.6	-2.4	-13.1
022	-13.0	-2.2	7.7	16.4	23.4	27.9	29.5	27.9	23.4	16.4	7.7	-2.2	-13.0
023	-12.9	-2.1	7.8	16.6	23.5	28.1	29.7	28.1	23.5	16.6	7.8	-2.1	-12.9
024	-12.7	-2.0	8.0	16.7	23.7	28.3	29.9	28.3	23.7	16.7	8.0	-2.0	-12.7
025	-12.6	-1.8	8.1	16.9	23.9	28.5	30.1	28.5	23.9	16.9	8.1	-1.8	-12.6
026	-12.5	-1.7	8.3	17.1	24.1	28.7	30.3	28.7	24.1	17.1	8.3	-1.7	-12.5
027	-12.4	-1.5	8.5	17.3	24.3	28.9	30.6	28.9	24.3	17.3	8.5	-1.5	-12.4
028	-12.2	-1.4	8.6	17.5	24.5	29.2	30.8	29.2	24.5	17.5	8.6	-1.4	-12.2
029	-12.1	-1.2	8.8	17.6	24.7	29.4	31.0	29.4	24.7	17.6	8.8	-1.2	-12.1
030	-11.9	-1.1	9.0	17.8	24.9	29.6	31.2	29.6	24.9	17.8	9.0	-1.1	-11.9
031	-11.8	-0.9	9.2	18.0	25.1	29.8	31.5	29.8	25.1	18.0	9.2	-0.9	-11.8

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 001 TO 031

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
001	-17.5	-8.5	-0.3	6.7	12.2	15.7	16.9	15.7	12.2	6.7	-0.3	-8.5	-17.5
002	-17.5	-8.5	-0.3	6.8	12.2	15.7	16.9	15.7	12.2	6.8	-0.3	-8.5	-17.5
003	-17.4	-8.4	-0.2	6.8	12.3	15.8	17.0	15.8	12.3	6.8	-0.2	-8.4	-17.4
004	-17.4	-8.3	-0.1	6.9	12.4	15.9	17.1	15.9	12.4	6.9	-0.1	-8.3	-17.4
005	-17.3	-8.3	-0.1	7.0	12.5	16.0	17.2	16.0	12.5	7.0	-0.1	-8.3	-17.3
006	-17.2	-8.2	0.0	7.1	12.5	16.0	17.3	16.0	12.5	7.1	0.0	-8.2	-17.2
007	-17.2	-8.1	0.1	7.1	12.6	16.1	17.3	16.1	12.6	7.1	0.1	-8.1	-17.2
008	-17.1	-8.1	0.2	7.2	12.7	16.2	17.5	16.2	12.7	7.2	0.2	-8.1	-17.1
009	-17.0	-8.0	0.3	7.3	12.8	16.3	17.6	16.3	12.8	7.3	0.3	-8.0	-17.0
010	-16.9	-7.9	0.4	7.4	12.9	16.5	17.7	16.5	12.9	7.4	0.4	-7.9	-16.9
011	-16.8	-7.8	0.5	7.5	13.1	16.6	17.8	16.6	13.1	7.5	0.5	-7.8	-16.8
012	-16.7	-7.7	0.6	7.7	13.2	16.7	17.9	16.7	13.2	7.7	0.6	-7.7	-16.7
013	-16.6	-7.6	0.7	7.8	13.3	16.8	18.1	16.8	13.3	7.8	0.7	-7.6	-16.6
014	-16.5	-7.5	0.8	7.9	13.4	17.0	18.2	17.0	13.4	7.9	0.8	-7.5	-16.5
015	-16.4	-7.4	0.9	8.0	13.6	17.1	18.3	17.1	13.6	8.0	0.9	-7.4	-16.4
016	-16.3	-7.2	1.0	8.2	13.7	17.3	18.5	17.3	13.7	8.2	1.0	-7.2	-16.3
017	-16.2	-7.1	1.2	8.3	13.9	17.4	18.6	17.4	13.9	8.3	1.2	-7.1	-16.2
018	-16.1	-7.0	1.3	8.4	14.0	17.6	18.8	17.6	14.0	8.4	1.3	-7.0	-16.1
019	-15.9	-6.9	1.4	8.6	14.2	17.7	19.0	17.7	14.2	8.6	1.4	-6.9	-15.9
020	-15.8	-6.7	1.6	8.8	14.3	17.9	19.2	17.9	14.3	8.8	1.6	-6.7	-15.8
021	-15.7	-6.6	1.7	8.9	14.5	18.1	19.3	18.1	14.5	8.9	1.7	-6.6	-15.7
022	-15.5	-6.4	1.9	9.1	14.7	18.3	19.5	18.3	14.7	9.1	1.9	-6.4	-15.5
023	-15.4	-6.3	2.1	9.3	14.9	18.5	19.7	18.5	14.9	9.3	2.1	-6.3	-15.4
024	-15.2	-6.1	2.2	9.4	15.1	18.7	19.9	18.7	15.1	9.4	2.2	-6.1	-15.2
025	-15.1	-6.0	2.4	9.6	15.3	18.9	20.1	18.9	15.3	9.6	2.4	-6.0	-15.1
026	-14.9	-5.8	2.6	9.8	15.5	19.1	20.3	19.1	15.5	9.8	2.6	-5.8	-14.9
027	-14.8	-5.6	2.8	10.0	15.7	19.3	20.6	19.3	15.7	10.0	2.8	-5.6	-14.8
028	-14.6	-5.5	2.9	10.2	15.9	19.5	20.8	19.5	15.9	10.2	2.9	-5.5	-14.6
029	-14.4	-5.3	3.1	10.4	16.1	19.7	21.0	19.7	16.1	10.4	3.1	-5.3	-14.4
030	-14.3	-5.1	3.3	10.6	16.3	20.0	21.2	20.0	16.3	10.6	3.3	-5.1	-14.3
031	-14.1	-4.9	3.5	10.8	16.5	20.2	21.5	20.2	16.5	10.8	3.5	-4.9	-14.1

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 001 TO 031

JDATE	LOCAL STANDARD TIME												
	06	07	08	09	10	11	12	13	14	15	16	17	18
001	-19.9	-12.8	-6.3	-0.9	3.3	6.0	6.9	6.0	3.3	-0.9	-6.3	-12.8	-19.9
002	-19.8	-12.7	-6.3	-0.8	3.4	6.0	6.9	6.0	3.4	-0.8	-6.3	-12.7	-19.8
003	-19.8	-12.7	-6.2	-0.7	3.5	6.1	7.0	6.1	3.5	-0.7	-6.2	-12.7	-19.8
004	-19.7	-12.6	-6.1	-0.7	3.5	6.2	7.1	6.2	3.5	-0.7	-6.1	-12.6	-19.7
005	-19.6	-12.5	-6.1	-0.6	3.6	6.3	7.2	6.3	3.6	-0.6	-6.1	-12.5	-19.6
006	-19.6	-12.4	-6.0	-0.5	3.7	6.3	7.3	6.3	3.7	-0.5	-6.0	-12.4	-19.6
007	-19.5	-12.4	-5.9	-0.4	3.8	6.4	7.3	6.4	3.8	-0.4	-5.9	-12.4	-19.5
008	-19.4	-12.3	-5.8	-0.3	3.9	6.5	7.5	6.5	3.9	-0.3	-5.8	-12.3	-19.4
009	-19.3	-12.2	-5.7	-0.2	4.0	6.7	7.6	6.7	4.0	-0.2	-5.7	-12.2	-19.3
010	-19.2	-12.1	-5.6	-0.1	4.1	6.8	7.7	6.8	4.1	-0.1	-5.6	-12.1	-19.2
011	-19.1	-12.0	-5.5	0.0	4.2	6.9	7.8	6.9	4.2	0.0	-5.5	-12.0	-19.1
012	-19.0	-11.9	-5.4	0.1	4.3	7.0	7.9	7.0	4.3	0.1	-5.4	-11.9	-19.0
013	-18.9	-11.7	-5.3	0.2	4.5	7.1	8.1	7.1	4.5	0.2	-5.3	-11.7	-18.9
014	-18.8	-11.6	-5.1	0.4	4.6	7.3	8.2	7.3	4.6	0.4	-5.1	-11.6	-18.8
015	-18.6	-11.5	-5.0	0.5	4.7	7.4	8.3	7.4	4.7	0.5	-5.0	-11.5	-18.6
016	-18.5	-11.4	-4.9	0.7	4.9	7.6	8.5	7.6	4.9	0.7	-4.9	-11.4	-18.5
017	-18.4	-11.2	-4.7	0.8	5.0	7.7	8.6	7.7	5.0	0.8	-4.7	-11.2	-18.4
018	-18.2	-11.1	-4.6	1.0	5.2	7.9	8.8	7.9	5.2	1.0	-4.6	-11.1	-18.2
019	-18.1	-10.9	-4.4	1.1	5.4	8.1	9.0	8.1	5.4	1.1	-4.4	-10.9	-18.1
020	-17.9	-10.8	-4.3	1.3	5.5	8.2	9.2	8.2	5.5	1.3	-4.3	-10.8	-17.9
021	-17.8	-10.6	-4.1	1.4	5.7	8.4	9.3	8.4	5.7	1.4	-4.1	-10.6	-17.8
022	-17.6	-10.5	-3.9	1.6	5.9	8.6	9.5	8.6	5.9	1.6	-3.9	-10.5	-17.6
023	-17.5	-10.3	-3.8	1.8	6.1	8.8	9.7	8.8	6.1	1.8	-3.8	-10.3	-17.5
024	-17.3	-10.1	-3.6	2.0	6.3	9.0	9.9	9.0	6.3	2.0	-3.6	-10.1	-17.3
025	-17.1	-9.9	-3.4	2.2	6.5	9.2	10.1	9.2	6.5	2.2	-3.4	-9.9	-17.1
026	-16.9	-9.8	-3.2	2.4	6.7	9.4	10.3	9.4	6.7	2.4	-3.2	-9.8	-16.9
027	-16.8	-9.6	-3.0	2.6	6.9	9.6	10.6	9.6	6.9	2.6	-3.0	-9.6	-16.8
028	-16.6	-9.4	-2.8	2.8	7.1	9.8	10.8	9.8	7.1	2.8	-2.8	-9.4	-16.6
029	-16.4	-9.2	-2.6	3.0	7.3	10.1	11.0	10.1	7.3	3.0	-2.6	-9.2	-16.4
030	-16.2	-9.0	-2.4	3.2	7.6	10.3	11.2	10.3	7.6	3.2	-2.4	-9.0	-16.2
031	-16.0	-8.8	-2.2	3.5	7.8	10.5	11.5	10.5	7.8	3.5	-2.2	-8.8	-16.0

APPENDIX B

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 032 TO 060

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 032 TO 060

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
032	-6.2	7.1	19.8	31.6	41.7	49.0	51.7	49.0	41.7	31.6	19.8	7.1	-6.2
033	-6.1	7.2	19.9	31.7	41.9	49.2	52.0	49.2	41.9	31.7	19.9	7.2	-6.1
034	-6.0	7.3	20.1	31.9	42.1	49.5	52.2	49.5	42.1	31.9	20.1	7.3	-6.0
035	-5.9	7.4	20.2	32.1	42.3	49.7	52.5	49.7	42.3	32.1	20.2	7.4	-5.9
036	-5.8	7.5	20.3	32.2	42.5	50.0	52.8	50.0	42.5	32.2	20.3	7.5	-5.8
037	-5.7	7.6	20.5	32.4	42.7	50.2	53.1	50.2	42.7	32.4	20.5	7.6	-5.7
038	-5.6	7.8	20.6	32.6	43.0	50.5	53.3	50.5	43.0	32.6	20.6	7.8	-5.6
039	-5.5	7.9	20.8	32.8	43.2	50.8	53.6	50.8	43.2	32.8	20.8	7.9	-5.5
040	-5.4	8.0	20.9	32.9	43.4	51.0	53.9	51.0	43.4	32.9	20.9	8.0	-5.4
041	-5.3	8.1	21.0	33.1	43.6	51.3	54.2	51.3	43.6	33.1	21.0	8.1	-5.3
042	-5.2	8.2	21.2	33.3	43.9	51.6	54.5	51.6	43.9	33.3	21.2	8.2	-5.2
043	-5.1	8.3	21.3	33.5	44.1	51.9	54.8	51.9	44.1	33.5	21.3	8.3	-5.1
044	-5.0	8.5	21.5	33.7	44.3	52.1	55.1	52.1	44.3	33.7	21.5	8.5	-5.0
045	-4.9	8.6	21.6	33.9	44.6	52.4	55.5	52.4	44.6	33.9	21.6	8.6	-4.9
046	-4.8	8.7	21.8	34.1	44.8	52.7	55.8	52.7	44.8	34.1	21.8	8.7	-4.8
047	-4.7	8.9	22.0	34.3	45.1	53.0	56.1	53.0	45.1	34.3	22.0	8.9	-4.7
048	-4.6	9.0	22.1	34.5	45.3	53.3	56.4	53.3	45.3	34.5	22.1	9.0	-4.6
049	-4.5	9.1	22.3	34.7	45.6	53.7	56.8	53.7	45.6	34.7	22.3	9.1	-4.5
050	-4.4	9.3	22.4	34.9	45.8	54.0	57.1	54.0	45.8	34.9	22.4	9.3	-4.4
051	-4.3	9.4	22.6	35.1	46.1	54.3	57.5	54.3	46.1	35.1	22.6	9.4	-4.3
052	-4.1	9.5	22.8	35.3	46.3	54.6	57.8	54.6	46.3	35.3	22.8	9.5	-4.1
053	-4.0	9.7	22.9	35.5	46.6	54.9	58.2	54.9	46.6	35.5	22.9	9.7	-4.0
054	-3.9	9.8	23.1	35.7	46.9	55.3	58.5	55.3	46.9	35.7	23.1	9.8	-3.9
055	-3.8	10.0	23.3	35.9	47.1	55.6	58.9	55.6	47.1	35.9	23.3	10.0	-3.8
056	-3.6	10.1	23.5	36.1	47.4	55.9	59.3	55.9	47.4	36.1	23.5	10.1	-3.6
057	-3.5	10.2	23.6	36.3	47.7	56.2	59.7	56.2	47.7	36.3	23.6	10.2	-3.5
058	-3.4	10.4	23.8	36.5	47.9	56.6	60.0	56.6	47.9	36.5	23.8	10.4	-3.4
059	-3.3	10.5	24.0	36.7	48.2	56.9	60.4	56.9	48.2	36.7	24.0	10.5	-3.3
060	-3.1	10.7	24.1	37.0	48.5	57.3	60.8	57.3	48.5	37.0	24.1	10.7	-3.1

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 032 TO 060

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
032	-9.0	3.2	14.7	25.1	33.7	39.6	41.7	39.6	33.7	25.1	14.7	3.2	-9.0
033	-8.9	3.4	14.9	25.3	34.0	39.9	42.0	39.9	34.0	25.3	14.9	3.4	-8.9
034	-8.8	3.5	15.1	25.5	34.2	40.1	42.2	40.1	34.2	25.5	15.1	3.5	-8.8
035	-8.6	3.6	15.2	25.7	34.4	40.4	42.5	40.4	34.4	25.7	15.2	3.6	-8.6
036	-8.5	3.8	15.4	25.9	34.6	40.6	42.8	40.6	34.6	25.9	15.4	3.8	-8.5
037	-8.4	3.9	15.6	26.1	34.9	40.9	43.1	40.9	34.9	26.1	15.6	3.9	-8.4
038	-8.2	4.1	15.8	26.3	35.1	41.1	43.3	41.1	35.1	26.3	15.8	4.1	-8.2
039	-8.1	4.2	15.9	26.5	35.4	41.4	43.6	41.4	35.4	26.5	15.9	4.2	-8.1
040	-8.0	4.4	16.1	26.7	35.6	41.7	43.9	41.7	35.6	26.7	16.1	4.4	-8.0
041	-7.8	4.6	16.3	27.0	35.9	42.0	44.2	42.0	35.9	27.0	16.3	4.6	-7.8
042	-7.7	4.7	16.5	27.2	36.1	42.3	44.5	42.3	36.1	27.2	16.5	4.7	-7.7
043	-7.5	4.9	16.7	27.4	36.4	42.6	44.8	42.6	36.4	27.4	16.7	4.9	-7.5
044	-7.4	5.1	16.9	27.6	36.6	42.9	45.1	42.9	36.6	27.6	16.9	5.1	-7.4
045	-7.2	5.2	17.1	27.9	36.9	43.2	45.5	43.2	36.9	27.9	17.1	5.2	-7.2
046	-7.1	5.4	17.3	28.1	37.2	43.5	45.8	43.5	37.2	28.1	17.3	5.4	-7.1
047	-6.9	5.6	17.5	28.3	37.4	43.8	46.1	43.8	37.4	28.3	17.5	5.6	-6.9
048	-6.7	5.8	17.7	28.6	37.7	44.1	46.4	44.1	37.7	28.6	17.7	5.8	-6.7
049	-6.6	6.0	17.9	28.8	38.0	44.4	46.8	44.4	38.0	28.8	17.9	6.0	-6.6
050	-6.4	6.1	18.1	29.0	38.3	44.8	47.1	44.8	38.3	29.0	18.1	6.1	-6.4
051	-6.2	6.3	18.3	29.3	38.6	45.1	47.5	45.1	38.6	29.3	18.3	6.3	-6.2
052	-6.1	6.5	18.5	29.5	38.9	45.4	47.8	45.4	38.9	29.5	18.5	6.5	-6.1
053	-5.9	6.7	18.7	29.8	39.2	45.8	48.2	45.8	39.2	29.8	18.7	6.7	-5.9
054	-5.7	6.9	19.0	30.1	39.5	46.1	48.5	46.1	39.5	30.1	19.0	6.9	-5.7
055	-5.5	7.1	19.2	30.3	39.8	46.4	48.9	46.4	39.8	30.3	19.2	7.1	-5.5
056	-5.3	7.3	19.4	30.6	40.1	46.8	49.3	46.8	40.1	30.6	19.4	7.3	-5.3
057	-5.2	7.5	19.6	30.8	40.4	47.1	49.7	47.1	40.4	30.8	19.6	7.5	-5.2
058	-5.0	7.7	19.9	31.1	40.7	47.5	50.0	47.5	40.7	31.1	19.9	7.7	-5.0
059	-4.8	7.9	20.1	31.4	41.0	47.9	50.4	47.9	41.0	31.4	20.1	7.9	-4.8
060	-4.6	8.1	20.3	31.6	41.3	48.2	50.8	48.2	41.3	31.6	20.3	8.1	-4.6

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 032 TO 060

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
032	-11.6	-0.8	9.3	18.2	25.4	30.1	31.7	30.1	25.4	18.2	9.3	-0.8	-11.6
033	-11.5	-0.6	9.5	18.4	25.6	30.3	32.0	30.3	25.6	18.4	9.5	-0.6	-11.5
034	-11.3	-0.4	9.7	18.7	25.8	30.6	32.2	30.6	25.8	18.7	9.7	-0.4	-11.3
035	-11.1	-0.2	9.9	18.9	26.1	30.8	32.5	30.8	26.1	18.9	9.9	-0.2	-11.1
036	-11.0	-0.1	10.1	19.1	26.3	31.1	32.8	31.1	26.3	19.1	10.1	-0.1	-11.0
037	-10.8	0.1	10.3	19.3	26.6	31.4	33.1	31.4	26.6	19.3	10.3	0.1	-10.8
038	-10.6	0.3	10.5	19.5	26.8	31.6	33.3	31.6	26.8	19.5	10.5	0.3	-10.6
039	-10.4	0.5	10.7	19.8	27.1	31.9	33.6	31.9	27.1	19.8	10.7	0.5	-10.4
040	-10.3	0.7	11.0	20.0	27.3	32.2	33.9	32.2	27.3	20.0	11.0	0.7	-10.3
041	-10.1	0.9	11.2	20.3	27.6	32.5	34.2	32.5	27.6	20.3	11.2	0.9	-10.1
042	-9.9	1.1	11.4	20.5	27.9	32.8	34.5	32.8	27.9	20.5	11.4	1.1	-9.9
043	-9.7	1.3	11.6	20.8	28.2	33.1	34.8	33.1	28.2	20.8	11.6	1.3	-9.7
044	-9.5	1.5	11.9	21.0	28.4	33.4	35.1	33.4	28.4	21.0	11.9	1.5	-9.5
045	-9.3	1.7	12.1	21.3	28.7	33.7	35.5	33.7	28.7	21.3	12.1	1.7	-9.3
046	-9.1	2.0	12.3	21.5	29.0	34.0	35.8	34.0	29.0	21.5	12.3	2.0	-9.1
047	-8.9	2.2	12.6	21.8	29.3	34.3	36.1	34.3	29.3	21.8	12.6	2.2	-8.9
048	-8.7	2.4	12.8	22.1	29.6	34.7	36.4	34.7	29.6	22.1	12.8	2.4	-8.7
049	-8.5	2.6	13.1	22.4	29.9	35.0	36.8	35.0	29.9	22.4	13.1	2.6	-8.5
050	-8.2	2.9	13.3	22.6	30.2	35.3	37.1	35.3	30.2	22.6	13.3	2.9	-8.2
051	-8.0	3.1	13.6	22.9	30.5	35.7	37.5	35.7	30.5	22.9	13.6	3.1	-8.0
052	-7.8	3.3	13.8	23.2	30.9	36.0	37.8	36.0	30.9	23.2	13.8	3.3	-7.8
053	-7.6	3.6	14.1	23.5	31.2	36.3	38.2	36.3	31.2	23.5	14.1	3.6	-7.6
054	-7.3	3.8	14.3	23.8	31.5	36.7	38.5	36.7	31.5	23.8	14.3	3.8	-7.3
055	-7.1	4.1	14.6	24.1	31.8	37.0	38.9	37.0	31.8	24.1	14.6	4.1	-7.1
056	-6.9	4.3	14.9	24.4	32.2	37.4	39.3	37.4	32.2	24.4	14.9	4.3	-6.9
057	-6.6	4.6	15.1	24.7	32.5	37.8	39.7	37.8	32.5	24.7	15.1	4.6	-6.6
058	-6.4	4.8	15.4	25.0	32.8	38.1	40.0	38.1	32.8	25.0	15.4	4.8	-6.4
059	-6.1	5.1	15.7	25.3	33.2	38.5	40.4	38.5	33.2	25.3	15.7	5.1	-6.1
060	-5.9	5.3	16.0	25.6	33.5	38.9	40.8	38.9	33.5	25.6	16.0	5.3	-5.9

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 032 TO 060

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
032	-13.9	-4.7	3.7	11.0	16.8	20.5	21.7	20.5	16.8	11.0	3.7	-4.7	-13.9
033	-13.7	-4.5	3.9	11.3	17.0	20.7	22.0	20.7	17.0	11.3	3.9	-4.5	-13.7
034	-13.5	-4.3	4.2	11.5	17.3	21.0	22.2	21.0	17.3	11.5	4.2	-4.3	-13.5
035	-13.3	-4.1	4.4	11.7	17.5	21.2	22.5	21.2	17.5	11.7	4.4	-4.1	-13.3
036	-13.1	-3.9	4.6	12.0	17.8	21.5	22.8	21.5	17.8	12.0	4.6	-3.9	-13.1
037	-12.9	-3.7	4.8	12.2	18.0	21.8	23.1	21.8	18.0	12.2	4.8	-3.7	-12.9
038	-12.7	-3.5	5.1	12.5	18.3	22.0	23.3	22.0	18.3	12.5	5.1	-3.5	-12.7
039	-12.5	-3.2	5.3	12.7	18.5	22.3	23.6	22.3	18.5	12.7	5.3	-3.2	-12.5
040	-12.3	-3.0	5.5	13.0	18.8	22.6	23.9	22.6	18.8	13.0	5.5	-3.0	-12.3
041	-12.0	-2.8	5.8	13.2	19.1	22.9	24.2	22.9	19.1	13.2	5.8	-2.8	-12.0
042	-11.8	-2.5	6.0	13.5	19.4	23.2	24.5	23.2	19.4	13.5	6.0	-2.5	-11.8
043	-11.6	-2.3	6.3	13.8	19.7	23.5	24.8	23.5	19.7	13.8	6.3	-2.3	-11.6
044	-11.3	-2.0	6.6	14.1	20.0	23.8	25.1	23.8	20.0	14.1	6.6	-2.0	-11.3
045	-11.1	-1.8	6.8	14.3	20.3	24.1	25.5	24.1	20.3	14.3	6.8	-1.8	-11.1
046	-10.8	-1.5	7.1	14.6	20.6	24.4	25.8	24.4	20.6	14.6	7.1	-1.5	-10.8
047	-10.6	-1.3	7.4	14.9	20.9	24.8	26.1	24.8	20.9	14.9	7.4	-1.3	-10.6
048	-10.3	-1.0	7.6	15.2	21.2	25.1	26.4	25.1	21.2	15.2	7.6	-1.0	-10.3
049	-10.1	-0.8	7.9	15.5	21.5	25.4	26.8	25.4	21.5	15.5	7.9	-0.8	-10.1
050	-9.8	-0.5	8.2	15.8	21.8	25.8	27.1	25.8	21.8	15.8	8.2	-0.5	-9.8
051	-9.6	-0.2	8.5	16.1	22.2	26.1	27.5	26.1	22.2	16.1	8.5	-0.2	-9.6
052	-9.3	0.1	8.8	16.4	22.5	26.4	27.8	26.4	22.5	16.4	8.8	0.1	-9.3
053	-9.0	0.3	9.1	16.7	22.8	26.8	28.2	26.8	22.8	16.7	9.1	0.3	-9.0
054	-8.8	0.6	9.4	17.1	23.2	27.2	28.5	27.2	23.2	17.1	9.4	0.6	-8.8
055	-8.5	0.9	9.7	17.4	23.5	27.5	28.9	27.5	23.5	17.4	9.7	0.9	-8.5
056	-8.2	1.2	10.0	17.7	23.9	27.9	29.3	27.9	23.9	17.7	10.0	1.2	-8.2
057	-7.9	1.5	10.3	18.0	24.2	28.2	29.7	28.2	24.2	18.0	10.3	1.5	-7.9
058	-7.6	1.8	10.6	18.4	24.6	28.6	30.0	28.6	24.6	18.4	10.6	1.8	-7.6
059	-7.3	2.1	10.9	18.7	24.9	29.0	30.4	29.0	24.9	18.7	10.9	2.1	-7.3
060	-7.0	2.4	11.2	19.0	25.3	29.4	30.8	29.4	25.3	19.0	11.2	2.4	-7.0

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 032 TO 060

JDATE	LOCAL STANDARD TIME												
	06	07	08	09	10	11	12	13	14	15	16	17	18
032	-15.7	-8.5	-1.9	3.7	8.0	10.8	11.7	10.8	8.0	3.7	-1.9	-8.5	-15.7
033	-15.5	-8.3	-1.7	3.9	8.3	11.0	12.0	11.0	8.3	3.9	-1.7	-8.3	-15.5
034	-15.3	-8.1	-1.5	4.2	8.5	11.3	12.2	11.3	8.5	4.2	-1.5	-8.1	-15.3
035	-15.1	-7.9	-1.3	4.4	8.8	11.6	12.5	11.6	8.8	4.4	-1.3	-7.9	-15.1
036	-14.9	-7.6	-1.0	4.7	9.0	11.8	12.8	11.8	9.0	4.7	-1.0	-7.6	-14.9
037	-14.6	-7.4	-0.8	4.9	9.3	12.1	13.1	12.1	9.3	4.9	-0.8	-7.4	-14.6
038	-14.4	-7.1	-0.5	5.2	9.6	12.4	13.3	12.4	9.6	5.2	-0.5	-7.1	-14.4
039	-14.1	-6.9	-0.2	5.5	9.9	12.7	13.6	12.7	9.9	5.5	-0.2	-6.9	-14.1
040	-13.9	-6.6	0.0	5.7	10.1	13.0	13.9	13.0	10.1	5.7	0.0	-6.6	-13.9
041	-13.6	-6.4	0.3	6.0	10.4	13.2	14.2	13.2	10.4	6.0	0.3	-6.4	-13.6
042	-13.4	-6.1	0.6	6.3	10.7	13.5	14.5	13.5	10.7	6.3	0.6	-6.1	-13.4
043	-13.1	-5.8	0.8	6.6	11.0	13.9	14.8	13.9	11.0	6.6	0.8	-5.8	-13.1
044	-12.8	-5.6	1.1	6.9	11.3	14.2	15.1	14.2	11.3	6.9	1.1	-5.6	-12.8
045	-12.6	-5.3	1.4	7.2	11.6	14.5	15.5	14.5	11.6	7.2	1.4	-5.3	-12.6
046	-12.3	-5.0	1.7	7.5	11.9	14.8	15.8	14.8	11.9	7.5	1.7	-5.0	-12.3
047	-12.0	-4.7	2.0	7.8	12.3	15.1	16.1	15.1	12.3	7.8	2.0	-4.7	-12.0
048	-11.7	-4.4	2.3	8.1	12.6	15.5	16.4	15.5	12.6	8.1	2.3	-4.4	-11.7
049	-11.4	-4.1	2.6	8.4	12.9	15.8	16.8	15.8	12.9	8.4	2.6	-4.1	-11.4
050	-11.1	-3.8	2.9	8.7	13.2	16.1	17.1	16.1	13.2	8.7	2.9	-3.8	-11.1
051	-10.8	-3.5	3.2	9.1	13.6	16.5	17.5	16.5	13.6	9.1	3.2	-3.5	-10.8
052	-10.5	-3.2	3.5	9.4	13.9	16.8	17.8	16.8	13.9	9.4	3.5	-3.2	-10.5
053	-10.2	-2.9	3.9	9.7	14.3	17.2	18.2	17.2	14.3	9.7	3.9	-2.9	-10.2
054	-9.9	-2.6	4.2	10.0	14.6	17.5	18.5	17.5	14.6	10.0	4.2	-2.6	-9.9
055	-9.6	-2.3	4.5	10.4	15.0	17.9	18.9	17.9	15.0	10.4	4.5	-2.3	-9.6
056	-9.3	-1.9	4.8	10.7	15.3	18.3	19.3	18.3	15.3	10.7	4.8	-1.9	-9.3
057	-8.9	-1.6	5.2	11.1	15.7	18.6	19.7	18.6	15.7	11.1	5.2	-1.6	-8.9
058	-8.6	-1.3	5.5	11.4	16.1	19.0	20.0	19.0	16.1	11.4	5.5	-1.3	-8.6
059	-8.3	-1.0	5.9	11.8	16.4	19.4	20.4	19.4	16.4	11.8	5.9	-1.0	-8.3
060	-8.0	-0.6	6.2	12.1	16.8	19.8	20.8	19.8	16.8	12.1	6.2	-0.6	-8.0

APPENDIX C

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 061 TO 091

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 061 TO 091

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
061	-3.0	10.8	24.3	37.2	48.7	57.6	61.2	57.6	48.7	37.2	24.3	10.8	-3.0
062	-2.9	11.0	24.5	37.4	49.0	58.0	61.6	58.0	49.0	37.4	24.5	11.0	-2.9
063	-2.7	11.1	24.7	37.6	49.3	58.3	62.0	58.3	49.3	37.6	24.7	11.1	-2.7
064	-2.6	11.3	24.9	37.8	49.6	58.7	62.4	58.7	49.6	37.8	24.9	11.3	-2.6
065	-2.5	11.4	25.0	38.0	49.8	59.0	62.8	59.0	49.8	38.0	25.0	11.4	-2.5
066	-2.3	11.6	25.2	38.2	50.1	59.4	63.2	59.4	50.1	38.2	25.2	11.6	-2.3
067	-2.2	11.7	25.4	38.5	50.4	59.7	63.6	59.7	50.4	38.5	25.4	11.7	-2.2
068	-2.1	11.9	25.6	38.7	50.7	60.1	64.0	60.1	50.7	38.7	25.6	11.9	-2.1
069	-1.9	12.0	25.7	38.9	50.9	60.5	64.4	60.5	50.9	38.9	25.7	12.0	-1.9
070	-1.8	12.2	25.9	39.1	51.2	60.8	64.8	60.8	51.2	39.1	25.9	12.2	-1.8
071	-1.6	12.4	26.1	39.3	51.5	61.2	65.2	61.2	51.5	39.3	26.1	12.4	-1.6
072	-1.5	12.5	26.3	39.5	51.8	61.5	65.6	61.5	51.8	39.5	26.3	12.5	-1.5
073	-1.3	12.7	26.4	39.7	52.0	61.9	66.1	61.9	52.0	39.7	26.4	12.7	-1.3
074	-1.2	12.8	26.6	40.0	52.3	62.3	66.5	62.3	52.3	40.0	26.6	12.8	-1.2
075	-1.1	13.0	26.8	40.2	52.6	62.6	66.9	62.6	52.6	40.2	26.8	13.0	-1.1
076	-0.9	13.1	27.0	40.4	52.8	63.0	67.3	63.0	52.8	40.4	27.0	13.1	-0.9
077	-0.8	13.3	27.1	40.6	53.1	63.3	67.8	63.3	53.1	40.6	27.1	13.3	-0.8
078	-0.6	13.4	27.3	40.8	53.4	63.7	68.2	63.7	53.4	40.8	27.3	13.4	-0.6
079	-0.5	13.6	27.5	41.0	53.6	64.0	68.6	64.0	53.6	41.0	27.5	13.6	-0.5
080	-0.3	13.7	27.6	41.2	53.9	64.4	69.0	64.4	53.9	41.2	27.6	13.7	-0.3
081	-0.2	13.9	27.8	41.4	54.2	64.7	69.5	64.7	54.2	41.4	27.8	13.9	-0.2
082	0.0	14.0	28.0	41.6	54.4	65.1	69.9	65.1	54.4	41.6	28.0	14.0	0.0
083	0.1	14.2	28.1	41.8	54.7	65.4	70.3	65.4	54.7	41.8	28.1	14.2	0.1
084	0.3	14.3	28.3	42.0	54.9	65.8	70.7	65.8	54.9	42.0	28.3	14.3	0.3
085	0.4	14.5	28.5	42.2	55.1	66.1	71.2	66.1	55.1	42.2	28.5	14.5	0.4
086	0.5	14.6	28.6	42.4	55.4	66.5	71.6	66.5	55.4	42.4	28.6	14.6	0.5
087	0.7	14.8	28.8	42.5	55.6	66.8	72.0	66.8	55.6	42.5	28.8	14.8	0.7
088	0.8	14.9	29.0	42.7	55.9	67.1	72.5	67.1	55.9	42.7	29.0	14.9	0.8
089	1.0	15.1	29.1	42.9	56.1	67.5	72.9	67.5	56.1	42.9	29.1	15.1	1.0
090	1.1	15.2	29.3	43.1	56.3	67.8	73.3	67.8	56.3	43.1	29.3	15.2	1.1
091	1.3	15.4	29.4	43.3	56.5	68.1	73.7	68.1	56.5	43.3	29.4	15.4	1.3

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 061 TO 091

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
061	-4.4	8.3	20.6	31.9	41.6	48.6	51.2	48.6	41.6	31.9	20.6	8.3	-4.4
062	-4.2	8.5	20.8	32.2	42.0	49.0	51.6	49.0	42.0	32.2	20.8	8.5	-4.2
063	-4.0	8.7	21.0	32.4	42.3	49.3	52.0	49.3	42.3	32.4	21.0	8.7	-4.0
064	-3.8	9.0	21.3	32.7	42.6	49.7	52.4	49.7	42.6	32.7	21.3	9.0	-3.8
065	-3.6	9.2	21.5	33.0	42.9	50.1	52.8	50.1	42.9	33.0	21.5	9.2	-3.6
066	-3.4	9.4	21.7	33.3	43.3	50.5	53.2	50.5	43.3	33.3	21.7	9.4	-3.4
067	-3.2	9.6	22.0	33.5	43.6	50.8	53.6	50.8	43.6	33.5	22.0	9.6	-3.2
068	-3.0	9.8	22.2	33.8	43.9	51.2	54.0	51.2	43.9	33.8	22.2	9.8	-3.0
069	-2.8	10.0	22.5	34.1	44.2	51.6	54.4	51.6	44.2	34.1	22.5	10.0	-2.8
070	-2.6	10.3	22.7	34.4	44.6	52.0	54.8	52.0	44.6	34.4	22.7	10.3	-2.6
071	-2.4	10.5	23.0	34.7	44.9	52.4	55.2	52.4	44.9	34.7	23.0	10.5	-2.4
072	-2.2	10.7	23.2	34.9	45.2	52.8	55.6	52.8	45.2	34.9	23.2	10.7	-2.2
073	-2.0	10.9	23.4	35.2	45.6	53.2	56.1	53.2	45.6	35.2	23.4	10.9	-2.0
074	-1.8	11.1	23.7	35.5	45.9	53.5	56.5	53.5	45.9	35.5	23.7	11.1	-1.8
075	-1.5	11.4	23.9	35.8	46.2	53.9	56.9	53.9	46.2	35.8	23.9	11.4	-1.5
076	-1.3	11.6	24.2	36.0	46.5	54.3	57.3	54.3	46.5	36.0	24.2	11.6	-1.3
077	-1.1	11.8	24.4	36.3	46.9	54.7	57.8	54.7	46.9	36.3	24.4	11.8	-1.1
078	-0.9	12.0	24.6	36.6	47.2	55.1	58.2	55.1	47.2	36.6	24.6	12.0	-0.9
079	-0.7	12.2	24.9	36.9	47.5	55.5	58.6	55.5	47.5	36.9	24.9	12.2	-0.7
080	-0.5	12.5	25.1	37.1	47.9	55.9	59.0	55.9	47.9	37.1	25.1	12.5	-0.5
081	-0.3	12.7	25.4	37.4	48.2	56.3	59.5	56.3	48.2	37.4	25.4	12.7	-0.3
082	-0.1	12.9	25.6	37.7	48.5	56.7	59.9	56.7	48.5	37.7	25.6	12.9	-0.1
083	0.2	13.1	25.8	38.0	48.8	57.1	60.3	57.1	48.8	38.0	25.8	13.1	0.2
084	0.4	13.3	26.1	38.2	49.2	57.5	60.7	57.5	49.2	38.2	26.1	13.3	0.4
085	0.6	13.6	26.3	38.5	49.5	57.8	61.2	57.8	49.5	38.5	26.3	13.6	0.6
086	0.8	13.8	26.5	38.8	49.8	58.2	61.6	58.2	49.8	38.8	26.5	13.8	0.8
087	1.0	14.0	26.8	39.0	50.1	58.6	62.0	58.6	50.1	39.0	26.8	14.0	1.0
088	1.2	14.2	27.0	39.3	50.4	59.0	62.5	59.0	50.4	39.3	27.0	14.2	1.2
089	1.4	14.4	27.2	39.5	50.7	59.4	62.9	59.4	50.7	39.5	27.2	14.4	1.4
090	1.6	14.6	27.5	39.8	51.0	59.8	63.3	59.8	51.0	39.8	27.5	14.6	1.6
091	1.9	14.8	27.7	40.1	51.3	60.1	63.7	60.1	51.3	40.1	27.7	14.8	1.9

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 061 TO 091

JDATE	LOCAL STANDARD TIME												
	06	07	08	09	10	11	12	13	14	15	16	17	18
061	-5.7	5.6	16.3	25.9	33.9	39.2	41.2	39.2	33.9	25.9	16.3	5.6	-5.7
062	-5.4	5.9	16.5	26.2	34.2	39.6	41.6	39.6	34.2	26.2	16.5	5.9	-5.4
063	-5.2	6.1	16.8	26.5	34.5	40.0	42.0	40.0	34.5	26.5	16.8	6.1	-5.2
064	-4.9	6.4	17.1	26.8	34.9	40.4	42.4	40.4	34.9	26.8	17.1	6.4	-4.9
065	-4.6	6.6	17.4	27.2	35.3	40.8	42.8	40.8	35.3	27.2	17.4	6.6	-4.6
066	-4.4	6.9	17.7	27.5	35.6	41.2	43.2	41.2	35.6	27.5	17.7	6.9	-4.4
067	-4.1	7.2	18.0	27.8	36.0	41.6	43.6	41.6	36.0	27.8	18.0	7.2	-4.1
068	-3.9	7.5	18.3	28.1	36.3	42.0	44.0	42.0	36.3	28.1	18.3	7.5	-3.9
069	-3.6	7.7	18.6	28.4	36.7	42.4	44.4	42.4	36.7	28.4	18.6	7.7	-3.6
070	-3.3	8.0	18.9	28.8	37.1	42.8	44.8	42.8	37.1	28.8	18.9	8.0	-3.3
071	-3.1	8.3	19.2	29.1	37.4	43.2	45.2	43.2	37.4	29.1	19.2	8.3	-3.1
072	-2.8	8.6	19.5	29.4	37.8	43.6	45.6	43.6	37.8	29.4	19.5	8.6	-2.8
073	-2.5	8.8	19.8	29.8	38.2	44.0	46.1	44.0	38.2	29.8	19.8	8.8	-2.5
074	-2.3	9.1	20.1	30.1	38.5	44.4	46.5	44.4	38.5	30.1	20.1	9.1	-2.3
075	-2.0	9.4	20.4	30.4	38.9	44.8	46.9	44.8	38.9	30.4	20.4	9.4	-2.0
076	-1.7	9.7	20.7	30.7	39.3	45.2	47.3	45.2	39.3	30.7	20.7	9.7	-1.7
077	-1.4	10.0	21.0	31.1	39.6	45.6	47.8	45.6	39.6	31.1	21.0	10.0	-1.4
078	-1.2	10.2	21.3	31.4	40.0	46.0	48.2	46.0	40.0	31.4	21.3	10.2	-1.2
079	-0.9	10.5	21.6	31.7	40.4	46.4	48.6	46.4	40.4	31.7	21.6	10.5	-0.9
080	-0.6	10.8	21.8	32.1	40.7	46.8	49.0	46.8	40.7	32.1	21.8	10.8	-0.6
081	-0.3	11.1	22.1	32.4	41.1	47.2	49.5	47.2	41.1	32.4	22.1	11.1	-0.3
082	-0.1	11.4	22.4	32.7	41.5	47.6	49.9	47.6	41.5	32.7	22.4	11.4	-0.1
083	0.2	11.6	22.7	33.0	41.8	48.0	50.3	48.0	41.8	33.0	22.7	11.6	0.2
084	0.5	11.9	23.0	33.4	42.2	48.4	50.7	48.4	42.2	33.4	23.0	11.9	0.5
085	0.8	12.2	23.3	33.7	42.6	48.8	51.2	48.8	42.6	33.7	23.3	12.2	0.8
086	1.0	12.5	23.6	34.0	42.9	49.3	51.6	49.3	42.9	34.0	23.6	12.5	1.0
087	1.3	12.8	23.9	34.3	43.3	49.7	52.0	49.7	43.3	34.3	23.9	12.8	1.3
088	1.6	13.0	24.2	34.7	43.7	50.1	52.5	50.1	43.7	34.7	24.2	13.0	1.6
089	1.8	13.3	24.5	35.0	44.0	50.5	52.9	50.5	44.0	35.0	24.5	13.3	1.8
090	2.1	13.6	24.8	35.3	44.4	50.9	53.3	50.9	44.4	35.3	24.8	13.6	2.1
091	2.4	13.9	25.1	35.6	44.7	51.3	53.7	51.3	44.7	35.6	25.1	13.9	2.4

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 061 TO 091

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
061	-6.7	2.7	11.5	19.4	25.6	29.7	31.2	29.7	25.6	19.4	11.5	2.7	-6.7
062	-6.4	3.0	11.9	19.7	26.0	30.1	31.6	30.1	26.0	19.7	11.9	3.0	-6.4
063	-6.1	3.3	12.2	20.1	26.4	30.5	32.0	30.5	26.4	20.1	12.2	3.3	-6.1
064	-5.8	3.6	12.5	20.4	26.7	30.9	32.4	30.9	26.7	20.4	12.5	3.6	-5.8
065	-5.5	3.9	12.9	20.8	27.1	31.3	32.8	31.3	27.1	20.8	12.9	3.9	-5.5
066	-5.2	4.3	13.2	21.1	27.5	31.7	33.2	31.7	27.5	21.1	13.2	4.3	-5.2
067	-4.9	4.6	13.5	21.5	27.9	32.1	33.6	32.1	27.9	21.5	13.5	4.6	-4.9
068	-4.6	4.9	13.9	21.8	28.3	32.5	34.0	32.5	28.3	21.8	13.9	4.9	-4.6
069	-4.3	5.2	14.2	22.2	28.6	32.9	34.4	32.9	28.6	22.2	14.2	5.2	-4.3
070	-4.0	5.5	14.5	22.5	29.0	33.3	34.8	33.3	29.0	22.5	14.5	5.5	-4.0
071	-3.7	5.9	14.9	22.9	29.4	33.7	35.2	33.7	29.4	22.9	14.9	5.9	-3.7
072	-3.3	6.2	15.2	23.3	29.8	34.1	35.6	34.1	29.8	23.3	15.2	6.2	-3.3
073	-3.0	6.5	15.6	23.6	30.2	34.5	36.1	34.5	30.2	23.6	15.6	6.5	-3.0
074	-2.7	6.8	15.9	24.0	30.6	34.9	36.5	34.9	30.6	24.0	15.9	6.8	-2.7
075	-2.4	7.2	16.2	24.4	31.0	35.4	36.9	35.4	31.0	24.4	16.2	7.2	-2.4
076	-2.0	7.5	16.6	24.7	31.4	35.8	37.3	35.8	31.4	24.7	16.6	7.5	-2.0
077	-1.7	7.8	16.9	25.1	31.8	36.2	37.8	36.2	31.8	25.1	16.9	7.8	-1.7
078	-1.4	8.2	17.3	25.5	32.1	36.6	38.2	36.6	32.1	25.5	17.3	8.2	-1.4
079	-1.1	8.5	17.6	25.8	32.5	37.0	38.6	37.0	32.5	25.8	17.6	8.5	-1.1
080	-0.7	8.8	18.0	26.2	32.9	37.4	39.0	37.4	32.9	26.2	18.0	8.8	-0.7
081	-0.4	9.2	18.3	26.6	33.3	37.9	39.5	37.9	33.3	26.6	18.3	9.2	-0.4
082	-0.1	9.5	18.7	26.9	33.7	38.3	39.9	38.3	33.7	26.9	18.7	9.5	-0.1
083	0.2	9.8	19.0	27.3	34.1	38.7	40.3	38.7	34.1	27.3	19.0	9.8	0.2
084	0.6	10.2	19.4	27.7	34.5	39.1	40.7	39.1	34.5	27.7	19.4	10.2	0.6
085	0.9	10.5	19.7	28.0	34.9	39.5	41.2	39.5	34.9	28.0	19.7	10.5	0.9
086	1.2	10.8	20.0	28.4	35.3	39.9	41.6	39.9	35.3	28.4	20.0	10.8	1.2
087	1.6	11.1	20.4	28.8	35.7	40.4	42.0	40.4	35.7	28.8	20.4	11.1	1.6
088	1.9	11.5	20.7	29.1	36.1	40.8	42.5	40.8	36.1	29.1	20.7	11.5	1.9
089	2.2	11.8	21.1	29.5	36.5	41.2	42.9	41.2	36.5	29.5	21.1	11.8	2.2
090	2.5	12.1	21.4	29.9	36.9	41.6	43.3	41.6	36.9	29.9	21.4	12.1	2.5
091	2.9	12.5	21.7	30.2	37.2	42.0	43.7	42.0	37.2	30.2	21.7	12.5	2.9

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 061 TO 091

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
061	-7.6	-0.3	6.6	12.5	17.2	20.2	21.2	20.2	17.2	12.5	6.6	-0.3	-7.6
062	-7.3	0.1	6.9	12.9	17.5	20.5	21.6	20.5	17.5	12.9	6.9	0.1	-7.3
063	-6.9	0.4	7.3	13.2	17.9	20.9	22.0	20.9	17.9	13.2	7.3	0.4	-6.9
064	-6.6	0.8	7.6	13.6	18.3	21.3	22.4	21.3	18.3	13.6	7.6	0.8	-6.6
065	-6.3	1.1	8.0	14.0	18.7	21.7	22.8	21.7	18.7	14.0	8.0	1.1	-6.3
066	-5.9	1.5	8.4	14.4	19.1	22.1	23.2	22.1	19.1	14.4	8.4	1.5	-5.9
067	-5.6	1.8	8.7	14.7	19.5	22.5	23.6	22.5	19.5	14.7	8.7	1.8	-5.6
068	-5.2	2.2	9.1	15.1	19.9	22.9	24.0	22.9	19.9	15.1	9.1	2.2	-5.2
069	-4.8	2.5	9.5	15.5	20.3	23.3	24.4	23.3	20.3	15.5	9.5	2.5	-4.8
070	-4.5	2.9	9.8	15.9	20.7	23.7	24.8	23.7	20.7	15.9	9.8	2.9	-4.5
071	-4.1	3.3	10.2	16.3	21.1	24.2	25.2	24.2	21.1	16.3	10.2	3.3	-4.1
072	-3.8	3.6	10.6	16.7	21.5	24.6	25.6	24.6	21.5	16.7	10.6	3.6	-3.8
073	-3.4	4.0	11.0	17.1	21.9	25.0	26.1	25.0	21.9	17.1	11.0	4.0	-3.4
074	-3.0	4.4	11.3	17.4	22.3	25.4	26.5	25.4	22.3	17.4	11.3	4.4	-3.0
075	-2.7	4.7	11.7	17.8	22.7	25.8	26.9	25.8	22.7	17.8	11.7	4.7	-2.7
076	-2.3	5.1	12.1	18.2	23.1	26.2	27.3	26.2	23.1	18.2	12.1	5.1	-2.3
077	-1.9	5.5	12.5	18.6	23.5	26.7	27.8	26.7	23.5	18.6	12.5	5.5	-1.9
078	-1.6	5.8	12.9	19.0	23.9	27.1	28.2	27.1	23.9	19.0	12.9	5.8	-1.6
079	-1.2	6.2	13.2	19.4	24.3	27.5	28.6	27.5	24.3	19.4	13.2	6.2	-1.2
080	-0.8	6.6	13.6	19.8	24.7	27.9	29.0	27.9	24.7	19.8	13.6	6.6	-0.8
081	-0.5	7.0	14.0	20.2	25.1	28.4	29.5	28.4	25.1	20.2	14.0	7.0	-0.5
082	-0.1	7.3	14.4	20.6	25.6	28.8	29.9	28.8	25.6	20.6	14.4	7.3	-0.1
083	0.3	7.7	14.8	21.0	26.0	29.2	30.3	29.2	26.0	21.0	14.8	7.7	0.3
084	0.6	8.1	15.1	21.4	26.4	29.6	30.7	29.6	26.4	21.4	15.1	8.1	0.6
085	1.0	8.5	15.5	21.8	26.8	30.0	31.2	30.0	26.8	21.8	15.5	8.5	1.0
086	1.4	8.8	15.9	22.2	27.2	30.5	31.6	30.5	27.2	22.2	15.9	8.6	1.4
087	1.8	9.2	16.3	22.6	27.6	30.9	32.0	30.9	27.6	22.6	16.3	9.2	1.8
088	2.1	9.6	16.7	23.0	28.0	31.3	32.5	31.3	28.0	23.0	16.7	9.6	2.1
089	2.5	9.9	17.0	23.4	28.4	31.7	32.9	31.7	28.4	23.4	17.0	9.9	2.5
090	2.9	10.3	17.4	23.8	28.8	32.1	33.3	32.1	28.8	23.8	17.4	10.3	2.9
091	3.2	10.7	17.8	24.1	29.2	32.6	33.7	32.6	29.2	24.1	17.8	10.7	3.2

APPENDIX D

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 092 TO 121

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 092 TO 121

	LOCAL STANDARD TIME											
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
092	1.4	15.5	29.6	43.4	56.8	68.4	74.1	68.4	56.8	43.4	29.6	15.5	1.4
093	1.6	15.6	29.7	43.6	57.0	68.7	74.6	68.7	57.0	43.6	29.7	15.6	1.6
094	1.7	15.8	29.9	43.8	57.2	69.1	75.0	69.1	57.2	43.8	29.9	15.8	1.7
095	1.8	15.9	30.0	43.9	57.4	69.4	75.4	69.4	57.4	43.9	30.0	15.9	1.8
096	2.0	16.1	30.1	44.1	57.6	69.7	75.8	69.7	57.6	44.1	30.1	16.1	2.0
097	2.1	16.2	30.3	44.2	57.8	69.9	76.2	69.9	57.8	44.2	30.3	16.2	2.1
098	2.3	16.3	30.4	44.4	58.0	70.2	76.6	70.2	58.0	44.4	30.4	16.3	2.3
099	2.4	16.5	30.5	44.5	58.2	70.5	77.0	70.5	58.2	44.5	30.5	16.5	2.4
100	2.5	16.6	30.7	44.7	58.3	70.8	77.4	70.8	58.3	44.7	30.7	16.6	2.5
101	2.7	16.7	30.8	44.8	58.5	71.1	77.8	71.1	58.5	44.8	30.8	16.7	2.7
102	2.8	16.8	30.9	45.0	58.7	71.3	78.2	71.3	58.7	45.0	30.9	16.8	2.8
103	2.9	17.0	31.1	45.1	58.9	71.6	78.6	71.6	58.9	45.1	31.1	17.0	2.9
104	3.1	17.1	31.2	45.2	59.0	71.8	79.0	71.8	59.0	45.2	31.2	17.1	3.1
105	3.2	17.2	31.3	45.3	59.2	72.1	79.4	72.1	59.2	45.3	31.3	17.2	3.2
106	3.3	17.3	31.4	45.5	59.3	72.3	79.8	72.3	59.3	45.5	31.4	17.3	3.3
107	3.5	17.4	31.5	45.6	59.5	72.5	80.2	72.5	59.5	45.6	31.5	17.4	3.5
108	3.6	17.6	31.6	45.7	59.6	72.7	80.5	72.7	59.6	45.7	31.6	17.6	3.6
109	3.7	17.7	31.7	45.8	59.7	72.9	80.9	72.9	59.7	45.8	31.7	17.7	3.7
110	3.8	17.8	31.8	45.9	59.9	73.1	81.3	73.1	59.9	45.9	31.8	17.8	3.8
111	4.0	17.9	32.0	46.0	60.0	73.3	81.6	73.3	60.0	46.0	32.0	17.9	4.0
112	4.1	18.0	32.1	46.1	60.1	73.5	82.0	73.5	60.1	46.1	32.1	18.0	4.1
113	4.2	18.1	32.1	46.2	60.2	73.7	82.4	73.7	60.2	46.2	32.1	18.1	4.2
114	4.3	18.2	32.2	46.3	60.4	73.9	82.7	73.9	60.4	46.3	32.2	18.2	4.3
115	4.4	18.3	32.3	46.4	60.5	74.0	83.0	74.0	60.5	46.4	32.3	18.3	4.4
116	4.5	18.4	32.4	46.5	60.6	74.2	83.4	74.2	60.6	46.5	32.4	18.4	4.5
117	4.7	18.5	32.5	46.6	60.7	74.3	83.7	74.3	60.7	46.6	32.5	18.5	4.7
118	4.8	18.6	32.6	46.7	60.7	74.5	84.1	74.5	60.7	46.7	32.6	18.6	4.8
119	4.9	18.7	32.7	46.8	60.8	74.6	84.4	74.6	60.8	46.8	32.7	18.7	4.9
120	5.0	18.8	32.8	46.8	60.9	74.7	84.7	74.7	60.9	46.8	32.8	18.8	5.0
121	5.1	18.9	32.8	46.9	61.0	74.9	85.0	74.9	61.0	46.9	32.8	18.9	5.1

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 092 TO 121

	LOCAL STANDARD TIME											
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
092	2.1	15.1	27.9	40.3	51.6	60.5	64.1	60.5	51.6	40.3	27.9	15.1	2.1
093	2.3	15.3	28.1	40.6	51.9	60.9	64.6	60.9	51.9	40.6	28.1	15.3	2.3
094	2.5	15.5	28.3	40.8	52.2	61.3	65.0	61.3	52.2	40.8	28.3	15.5	2.5
095	2.7	15.7	28.6	41.0	52.5	61.6	65.4	61.6	52.5	41.0	28.6	15.7	2.7
096	2.9	15.9	28.8	41.3	52.8	62.0	65.8	62.0	52.8	41.3	28.8	15.9	2.9
097	3.1	16.1	29.0	41.5	53.1	62.3	66.2	62.3	53.1	41.5	29.0	16.1	3.1
098	3.3	16.3	29.2	41.8	53.4	62.7	66.6	62.7	53.4	41.8	29.2	16.3	3.3
099	3.5	16.5	29.4	42.0	53.7	63.1	67.0	63.1	53.7	42.0	29.4	16.5	3.5
100	3.7	16.7	29.6	42.2	53.9	63.4	67.4	63.4	53.9	42.2	29.6	16.7	3.7
101	3.9	16.9	29.8	42.4	54.2	63.7	67.8	63.7	54.2	42.4	29.8	16.9	3.9
102	4.1	17.1	30.0	42.7	54.5	64.1	68.2	64.1	54.5	42.7	30.0	17.1	4.1
103	4.3	17.3	30.2	42.9	54.7	64.4	68.6	64.4	54.7	42.9	30.2	17.3	4.3
104	4.5	17.4	30.4	43.1	55.0	64.8	69.0	64.8	55.0	43.1	30.4	17.4	4.5
105	4.7	17.6	30.6	43.3	55.2	65.1	69.4	65.1	55.2	43.3	30.6	17.6	4.7
106	4.9	17.8	30.8	43.5	55.5	65.4	69.8	65.4	55.5	43.5	30.8	17.8	4.9
107	5.1	18.0	31.0	43.7	55.7	65.7	70.2	65.7	55.7	43.7	31.0	18.0	5.1
108	5.2	18.2	31.1	43.9	56.0	66.0	70.5	66.0	56.0	43.9	31.1	18.2	5.2
109	5.4	18.3	31.3	44.1	56.2	66.4	70.9	66.4	56.2	44.1	31.3	18.3	5.4
110	5.6	18.5	31.5	44.3	56.4	66.7	71.3	66.7	56.4	44.3	31.5	18.5	5.6
111	5.8	18.7	31.7	44.5	56.7	67.0	71.6	67.0	56.7	44.5	31.7	18.7	5.8
112	6.0	18.9	31.8	44.7	56.9	67.2	72.0	67.2	56.9	44.7	31.8	18.9	6.0
113	6.1	19.0	32.0	44.8	57.1	67.5	72.4	67.5	57.1	44.8	32.0	19.0	6.1
114	6.3	19.2	32.2	45.0	57.3	67.8	72.7	67.8	57.3	45.0	32.2	19.2	6.3
115	6.5	19.3	32.3	45.2	57.5	68.1	73.0	68.1	57.5	45.2	32.3	19.3	6.5
116	6.6	19.5	32.5	45.4	57.7	68.4	73.4	68.4	57.7	45.4	32.5	19.5	6.6
117	6.8	19.7	32.6	45.5	57.9	68.6	73.7	68.6	57.9	45.5	32.6	19.7	6.8
118	7.0	19.8	32.8	45.7	58.1	68.9	74.1	68.9	58.1	45.7	32.8	19.8	7.0
119	7.1	20.0	32.9	45.8	58.3	69.1	74.4	69.1	58.3	45.8	32.9	20.0	7.1
120	7.3	20.1	33.1	46.0	58.5	69.4	74.7	69.4	58.5	46.0	33.1	20.1	7.3
121	7.4	20.2	33.2	46.1	58.6	69.6	75.0	69.6	58.6	46.1	33.2	20.2	7.4

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 092 TO 121

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
092	2.7	14.1	25.4	35.9	45.1	51.7	54.1	51.7	45.1	35.9	25.4	14.1	2.7
093	2.9	14.4	25.7	36.2	45.4	52.1	54.6	52.1	45.4	36.2	25.7	14.4	2.9
094	3.2	14.7	25.9	36.5	45.8	52.5	55.0	52.5	45.8	36.5	25.9	14.7	3.2
095	3.5	14.9	26.2	36.8	46.1	52.9	55.4	52.9	46.1	36.8	26.2	14.9	3.5
096	3.7	15.2	26.5	37.2	46.5	53.2	55.8	53.2	46.5	37.2	26.5	15.2	3.7
097	4.0	15.5	26.8	37.5	46.8	53.6	56.2	53.6	46.8	37.5	26.8	15.5	4.0
098	4.3	15.7	27.0	37.7	47.2	54.0	56.6	54.0	47.2	37.7	27.0	15.7	4.3
099	4.5	16.0	27.3	38.0	47.5	54.4	57.0	54.4	47.5	38.0	27.3	16.0	4.5
100	4.8	16.2	27.6	38.3	47.8	54.8	57.4	54.8	47.8	38.3	27.6	16.2	4.8
101	5.0	16.5	27.8	38.6	48.1	55.1	57.8	55.1	48.1	38.6	27.8	16.5	5.0
102	5.3	16.8	28.1	38.9	48.5	55.5	58.2	55.5	48.5	38.9	28.1	16.8	5.3
103	5.5	17.0	28.4	39.2	48.8	55.9	58.6	55.9	48.8	39.2	28.4	17.0	5.5
104	5.8	17.2	28.6	39.5	49.1	56.3	59.0	56.3	49.1	39.5	28.6	17.2	5.8
105	6.0	17.5	28.9	39.7	49.4	56.6	59.4	56.6	49.4	39.7	28.9	17.5	6.0
106	6.3	17.7	29.1	40.0	49.7	57.0	59.8	57.0	49.7	40.0	29.1	17.7	6.3
107	6.5	18.0	29.4	40.3	50.0	57.3	60.2	57.3	50.0	40.3	29.4	18.0	6.5
108	6.7	18.2	29.6	40.5	50.3	57.7	60.5	57.7	50.3	40.5	29.6	18.2	6.7
109	7.0	18.4	29.9	40.8	50.6	58.0	60.9	58.0	50.6	40.8	29.9	18.4	7.0
110	7.2	18.7	30.1	41.1	50.9	58.4	61.3	58.4	50.9	41.1	30.1	18.7	7.2
111	7.5	18.9	30.3	41.3	51.2	58.7	61.6	58.7	51.2	41.3	30.3	18.9	7.5
112	7.7	19.1	30.5	41.6	51.5	59.0	62.0	59.0	51.5	41.6	30.5	19.1	7.7
113	7.9	19.3	30.8	41.8	51.8	59.4	62.4	59.4	51.8	41.8	30.8	19.3	7.9
114	8.1	19.6	31.0	42.0	52.0	59.7	62.7	59.7	52.0	42.0	31.0	19.6	8.1
115	8.3	19.8	31.2	42.3	52.3	60.0	63.0	60.0	52.3	42.3	31.2	19.8	8.3
116	8.6	20.0	31.4	42.5	52.6	60.3	63.4	60.3	52.6	42.5	31.4	20.0	8.6
117	8.8	20.2	31.6	42.7	52.8	60.6	63.7	60.6	52.8	42.7	31.6	20.2	8.8
118	9.0	20.4	31.8	43.0	53.1	60.9	64.1	60.9	53.1	43.0	31.8	20.4	9.0
119	9.2	20.6	32.1	43.2	53.3	61.2	64.4	61.2	53.3	43.2	32.1	20.6	9.2
120	9.4	20.8	32.3	43.4	53.6	61.5	64.7	61.5	53.6	43.4	32.3	20.8	9.4
121	9.6	21.0	32.4	43.6	53.8	61.8	65.0	61.8	53.8	43.6	32.4	21.0	9.6

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 092 TO 121

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
092	3.2	12.8	22.1	30.6	37.6	42.4	44.1	42.4	37.6	30.6	22.1	12.8	3.2
093	3.5	13.1	22.4	30.9	38.0	42.8	44.6	42.8	38.0	30.9	22.4	13.1	3.5
094	3.8	13.4	22.7	31.3	38.4	43.2	45.0	43.2	38.4	31.3	22.7	13.4	3.8
095	4.1	13.7	23.1	31.6	38.8	43.6	45.4	43.6	38.8	31.6	23.1	13.7	4.1
096	4.4	14.1	23.4	32.0	39.1	44.0	45.8	44.0	39.1	32.0	23.4	14.1	4.4
097	4.8	14.4	23.7	32.3	39.5	44.4	46.2	44.4	39.5	32.3	23.7	14.4	4.8
098	5.1	14.7	24.1	32.7	39.9	44.8	46.6	44.8	39.9	32.7	24.1	14.7	5.1
099	5.4	15.0	24.4	33.0	40.3	45.2	47.0	45.2	40.3	33.0	24.4	15.0	5.4
100	5.7	15.3	24.7	33.4	40.6	45.6	47.4	45.6	40.6	33.4	24.7	15.3	5.7
101	6.0	15.6	25.0	33.7	41.0	46.0	47.8	46.0	41.0	33.7	25.0	15.6	6.0
102	6.3	15.9	25.3	34.0	41.3	46.4	48.2	46.4	41.3	34.0	25.3	15.9	6.3
103	6.6	16.2	25.6	34.3	41.7	46.8	48.6	46.8	41.7	34.3	25.6	16.2	6.6
104	6.9	16.5	25.9	34.7	42.1	47.2	49.0	47.2	42.1	34.7	25.9	16.5	6.9
105	7.2	16.8	26.2	35.0	42.4	47.5	49.4	47.5	42.4	35.0	26.2	16.8	7.2
106	7.5	17.1	26.5	35.3	42.7	47.9	49.8	47.9	42.7	35.3	26.5	17.1	7.5
107	7.8	17.4	26.8	35.6	43.1	48.3	50.2	48.3	43.1	35.6	26.8	17.4	7.8
108	8.1	17.7	27.1	35.9	43.4	48.6	50.5	48.6	43.4	35.9	27.1	17.7	8.1
109	8.3	18.0	27.4	36.2	43.8	49.0	50.9	49.0	43.8	36.2	27.4	18.0	8.3
110	8.6	18.2	27.7	36.5	44.1	49.3	51.3	49.3	44.1	36.5	27.7	18.2	8.6
111	8.9	18.5	28.0	36.8	44.4	49.7	51.6	49.7	44.4	36.8	28.0	18.5	8.9
112	9.2	18.8	28.3	37.1	44.7	50.0	52.0	50.0	44.7	37.1	28.3	18.8	9.2
113	9.4	19.0	28.5	37.4	45.0	50.4	52.4	50.4	45.0	37.4	28.5	19.0	9.4
114	9.7	19.3	28.8	37.7	45.4	50.7	52.7	50.7	45.4	37.7	28.8	19.3	9.7
115	10.0	19.6	29.1	38.0	45.7	51.1	53.0	51.1	45.7	38.0	29.1	19.6	10.0
116	10.2	19.8	29.3	38.3	46.0	51.4	53.4	51.4	46.0	38.3	29.3	19.8	10.2
117	10.5	20.1	29.6	38.6	46.3	51.7	53.7	51.7	46.3	38.6	29.6	20.1	10.5
118	10.7	20.3	29.9	38.8	46.6	52.0	54.1	52.0	46.6	38.8	29.9	20.3	10.7
119	11.0	20.6	30.1	39.1	46.8	52.3	54.4	52.3	46.8	39.1	30.1	20.6	11.0
120	11.2	20.8	30.4	39.3	47.1	52.7	54.7	52.7	47.1	39.3	30.4	20.8	11.2
121	11.4	21.0	30.6	39.6	47.4	53.0	55.0	53.0	47.4	39.6	30.6	21.0	11.4

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 092 TO 121

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
092	3.6	11.0	18.2	24.5	29.6	33.0	34.1	33.0	29.6	24.5	18.2	11.0	3.6
093	3.9	11.4	18.5	24.9	30.0	33.4	34.6	33.4	30.0	24.9	18.5	11.4	3.9
094	4.3	11.8	18.9	25.3	30.4	33.8	35.0	33.8	30.4	25.3	18.9	11.8	4.3
095	4.7	12.1	19.3	25.7	30.8	34.2	35.4	34.2	30.8	25.7	19.3	12.1	4.7
096	5.0	12.5	19.7	26.1	31.2	34.6	35.8	34.6	31.2	26.1	19.7	12.5	5.0
097	5.4	12.9	20.0	26.4	31.6	35.0	36.2	35.0	31.6	26.4	20.0	12.9	5.4
098	5.7	13.2	20.4	26.8	32.0	35.4	36.6	35.4	32.0	26.8	20.4	13.2	5.7
099	6.1	13.6	20.7	27.2	32.4	35.8	37.0	35.8	32.4	27.2	20.7	13.6	6.1
100	6.4	13.9	21.1	27.6	32.8	36.2	37.4	36.2	32.8	27.6	21.1	13.9	6.4
101	6.8	14.3	21.4	27.9	33.2	36.6	37.8	36.6	33.2	27.9	21.4	14.3	6.8
102	7.1	14.6	21.8	28.3	33.5	37.0	38.2	37.0	33.5	28.3	21.8	14.6	7.1
103	7.5	14.9	22.1	28.6	33.9	37.4	38.6	37.4	33.9	28.6	22.1	14.9	7.5
104	7.8	15.3	22.5	29.0	34.3	37.8	39.0	37.8	34.3	29.0	22.5	15.3	7.8
105	8.1	15.6	22.8	29.4	34.7	38.2	39.4	38.2	34.7	29.4	22.8	15.6	8.1
106	8.5	15.9	23.2	29.7	35.0	38.5	39.8	38.5	35.0	29.7	23.2	15.9	8.5
107	8.8	16.3	23.5	30.1	35.4	38.9	40.2	38.9	35.4	30.1	23.5	16.3	8.8
108	9.1	16.6	23.8	30.4	35.7	39.3	40.5	39.3	35.7	30.4	23.8	16.6	9.1
109	9.4	16.9	24.2	30.7	36.1	39.7	40.9	39.7	36.1	30.7	24.2	16.9	9.4
110	9.7	17.2	24.5	31.1	36.4	40.0	41.3	40.0	36.4	31.1	24.5	17.2	9.7
111	10.1	17.5	24.8	31.4	36.8	40.4	41.6	40.4	36.8	31.4	24.8	17.5	10.1
112	10.4	17.9	25.1	31.7	37.1	40.7	42.0	40.7	37.1	31.7	25.1	17.9	10.4
113	10.7	18.2	25.4	32.0	37.5	41.1	42.4	41.1	37.5	32.0	25.4	18.2	10.7
114	11.0	18.5	25.7	32.4	37.8	41.4	42.7	41.4	37.8	32.4	25.7	18.5	11.0
115	11.3	18.8	26.0	32.7	38.1	41.8	43.0	41.8	38.1	32.7	26.0	18.8	11.3
116	11.6	19.1	26.3	33.0	38.4	42.1	43.4	42.1	38.4	33.0	26.3	19.1	11.6
117	11.9	19.3	26.6	33.3	38.8	42.4	43.7	42.4	38.8	33.3	26.6	19.3	11.9
118	12.1	19.6	26.9	33.6	39.1	42.8	44.1	42.8	39.1	33.6	26.9	19.6	12.1
119	12.4	19.9	27.2	33.9	39.4	43.1	44.4	43.1	39.4	33.9	27.2	19.9	12.4
120	12.7	20.2	27.5	34.2	39.7	43.4	44.7	43.4	39.7	34.2	27.5	20.2	12.7
121	13.0	20.5	27.8	34.5	40.0	43.7	45.0	43.7	40.0	34.5	27.8	20.5	13.0

APPENDIX E

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 122 TO 152

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 122 TO 152

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
122	5.2	19.0	32.9	47.0	61.1	75.0	85.3	75.0	61.1	47.0	32.9	19.0	5.2
123	5.3	19.0	33.0	47.1	61.1	75.1	85.6	75.1	61.1	47.1	33.0	19.0	5.3
124	5.4	19.1	33.1	47.1	61.2	75.2	85.9	75.2	61.2	47.1	33.1	19.1	5.4
125	5.5	19.2	33.1	47.2	61.3	75.3	86.2	75.3	61.3	47.2	33.1	19.2	5.5
126	5.6	19.3	33.2	47.2	61.3	75.3	86.5	75.3	61.3	47.2	33.2	19.3	5.6
127	5.7	19.4	33.3	47.3	61.4	75.4	86.8	75.4	61.4	47.3	33.3	19.4	5.7
128	5.8	19.4	33.3	47.4	61.4	75.5	87.1	75.5	61.4	47.4	33.3	19.4	5.8
129	5.9	19.5	33.4	47.4	61.5	75.6	87.4	75.6	61.5	47.4	33.4	19.5	5.9
130	5.9	19.6	33.5	47.5	61.5	75.6	87.6	75.6	61.5	47.5	33.5	19.6	5.9
131	6.0	19.7	33.5	47.5	61.6	75.7	87.9	75.7	61.6	47.5	33.5	19.7	6.0
132	6.1	19.7	33.6	47.6	61.6	75.7	88.1	75.7	61.6	47.6	33.6	19.7	6.1
133	6.2	19.8	33.6	47.6	61.7	75.7	88.4	75.7	61.7	47.6	33.6	19.8	6.2
134	6.3	19.9	33.7	47.6	61.7	75.8	88.6	75.8	61.7	47.6	33.7	19.9	6.3
135	6.4	19.9	33.7	47.7	61.7	75.8	88.9	75.8	61.7	47.7	33.7	19.9	6.4
136	6.4	20.0	33.8	47.7	61.8	75.8	89.1	75.8	61.8	47.7	33.8	20.0	6.4
137	6.5	20.0	33.8	47.8	61.8	75.9	89.3	75.9	61.8	47.8	33.8	20.0	6.5
138	6.6	20.1	33.9	47.8	61.8	75.9	89.6	75.9	61.8	47.8	33.9	20.1	6.6
139	6.6	20.2	33.9	47.8	61.8	75.9	89.8	75.9	61.8	47.8	33.9	20.2	6.6
140	6.7	20.2	33.9	47.8	61.8	75.9	90.0	75.9	61.8	47.8	33.9	20.2	6.7
141	6.8	20.3	34.0	47.9	61.9	75.9	89.8	75.9	61.9	47.9	34.0	20.3	6.8
142	6.8	20.3	34.0	47.9	61.9	75.9	89.6	75.9	61.9	47.9	34.0	20.3	6.8
143	6.9	20.4	34.1	47.9	61.9	75.9	89.4	75.9	61.9	47.9	34.1	20.4	6.9
144	7.0	20.4	34.1	47.9	61.9	75.9	89.2	75.9	61.9	47.9	34.1	20.4	7.0
145	7.0	20.4	34.1	48.0	61.9	75.9	89.1	75.9	61.9	48.0	34.1	20.4	7.0
146	7.1	20.5	34.2	48.0	61.9	75.9	88.9	75.9	61.9	48.0	34.2	20.5	7.1
147	7.1	20.5	34.2	48.0	61.9	75.9	88.7	75.9	61.9	48.0	34.2	20.5	7.1
148	7.2	20.6	34.2	48.0	61.9	75.9	88.6	75.9	61.9	48.0	34.2	20.6	7.2
149	7.2	20.6	34.2	48.0	62.0	75.9	88.4	75.9	62.0	48.0	34.2	20.6	7.2
150	7.3	20.6	34.3	48.1	62.0	75.9	88.3	75.9	62.0	48.1	34.3	20.6	7.3
151	7.3	20.7	34.3	48.1	62.0	75.9	88.1	75.9	62.0	48.1	34.3	20.7	7.3
152	7.4	20.7	34.3	48.1	62.0	75.9	88.0	75.9	62.0	48.1	34.3	20.7	7.4

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 122 TO 152

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
122	7.6	20.4	33.4	46.3	58.8	69.9	75.3	69.9	58.8	46.3	33.4	20.4	7.6
123	7.7	20.5	33.5	46.4	59.0	70.1	75.6	70.1	59.0	46.4	33.5	20.5	7.7
124	7.9	20.7	33.6	46.6	59.1	70.3	75.9	70.3	59.1	46.6	33.6	20.7	7.9
125	8.0	20.8	33.7	46.7	59.3	70.5	76.2	70.5	59.3	46.7	33.7	20.8	8.0
126	8.2	20.9	33.9	46.8	59.5	70.8	76.5	70.8	59.5	46.8	33.9	20.9	8.2
127	8.3	21.0	34.0	47.0	59.6	71.0	76.8	71.0	59.6	47.0	34.0	21.0	8.3
128	8.4	21.2	34.1	47.1	59.7	71.2	77.1	71.2	59.7	47.1	34.1	21.2	8.4
129	8.6	21.3	34.2	47.2	59.9	71.4	77.4	71.4	59.9	47.2	34.2	21.3	8.6
130	8.7	21.4	34.3	47.3	60.0	71.6	77.6	71.6	60.0	47.3	34.3	21.4	8.7
131	8.8	21.5	34.4	47.4	60.1	71.7	77.9	71.7	60.1	47.4	34.4	21.5	8.8
132	9.0	21.6	34.6	47.5	60.3	71.9	78.1	71.9	60.3	47.5	34.6	21.6	9.0
133	9.1	21.7	34.7	47.6	60.4	72.1	78.4	72.1	60.4	47.6	34.7	21.7	9.1
134	9.2	21.8	34.8	47.7	60.5	72.3	78.6	72.3	60.5	47.7	34.8	21.8	9.2
135	9.3	22.0	34.9	47.8	60.6	72.4	78.9	72.4	60.6	47.8	34.9	22.0	9.3
136	9.4	22.1	34.9	47.9	60.7	72.6	79.1	72.6	60.7	47.9	34.9	22.1	9.4
137	9.5	22.1	35.0	48.0	60.8	72.7	79.3	72.7	60.8	48.0	35.0	22.1	9.5
138	9.6	22.2	35.1	48.1	60.9	72.9	79.6	72.9	60.9	48.1	35.1	22.2	9.6
139	9.7	22.3	35.2	48.2	61.0	73.0	79.8	73.0	61.0	48.2	35.2	22.3	9.7
140	9.8	22.4	35.3	48.3	61.1	73.1	80.0	73.1	61.1	48.3	35.3	22.4	9.8
141	9.9	22.5	35.4	48.4	61.2	73.3	80.2	73.3	61.2	48.4	35.4	22.5	9.9
142	10.0	22.6	35.5	48.4	61.3	73.4	80.4	73.4	61.3	48.4	35.5	22.6	10.0
143	10.1	22.7	35.5	48.5	61.4	73.5	80.6	73.5	61.4	48.5	35.5	22.7	10.1
144	10.2	22.8	35.6	48.6	61.5	73.6	80.8	73.6	61.5	48.6	35.6	22.8	10.2
145	10.3	22.8	35.7	48.6	61.5	73.7	80.9	73.7	61.5	48.6	35.7	22.8	10.3
146	10.4	22.9	35.7	48.7	61.6	73.8	81.1	73.8	61.6	48.7	35.7	22.9	10.4
147	10.5	23.0	35.8	48.8	61.7	73.9	81.3	73.9	61.7	48.8	35.8	23.0	10.5
148	10.5	23.0	35.9	48.8	61.7	74.0	81.4	74.0	61.7	48.8	35.9	23.0	10.5
149	10.6	23.1	35.9	48.9	61.8	74.1	81.6	74.1	61.8	48.9	35.9	23.1	10.6
150	10.7	23.2	36.0	48.9	61.9	74.2	81.7	74.2	61.9	48.9	36.0	23.2	10.7
151	10.7	23.2	36.0	49.0	61.9	74.3	81.9	74.3	61.9	49.0	36.0	23.2	10.7
152	10.8	23.3	36.1	49.0	62.0	74.4	82.0	74.4	62.0	49.0	36.1	23.3	10.8

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 122 TO 152

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
122	9.8	21.2	32.6	43.8	54.1	62.1	65.3	62.1	54.1	43.8	32.6	21.2	9.8
123	10.0	21.4	32.8	44.0	54.3	62.3	65.6	62.3	54.3	44.0	32.8	21.4	10.0
124	10.2	21.5	33.0	44.2	54.5	62.6	65.9	62.6	54.5	44.2	33.0	21.5	10.2
125	10.3	21.7	33.2	44.4	54.7	62.9	66.2	62.9	54.7	44.4	33.2	21.7	10.3
126	10.5	21.9	33.4	44.6	55.0	63.1	66.5	63.1	55.0	44.6	33.4	21.9	10.5
127	10.7	22.1	33.5	44.8	55.2	63.4	66.8	63.4	55.2	44.8	33.5	22.1	10.7
128	10.9	22.2	33.7	45.0	55.4	63.7	67.1	63.7	55.4	45.0	33.7	22.2	10.9
129	11.1	22.4	33.9	45.1	55.6	63.9	67.4	63.9	55.6	45.1	33.9	22.4	11.1
130	11.2	22.6	34.0	45.3	55.8	64.1	67.6	64.1	55.8	45.3	34.0	22.6	11.2
131	11.4	22.7	34.2	45.5	56.0	64.4	67.9	64.4	56.0	45.5	34.2	22.7	11.4
132	11.5	22.9	34.3	45.6	56.2	64.6	68.1	64.6	56.2	45.6	34.3	22.9	11.5
133	11.7	23.0	34.5	45.8	56.3	64.8	68.4	64.8	56.3	45.8	34.5	23.0	11.7
134	11.9	23.2	34.6	45.9	56.5	65.0	68.6	65.0	56.5	45.9	34.6	23.2	11.9
135	12.0	23.3	34.8	46.1	56.7	65.2	68.9	65.2	56.7	46.1	34.8	23.3	12.0
136	12.1	23.4	34.9	46.2	56.9	65.4	69.1	65.4	56.9	46.2	34.9	23.4	12.1
137	12.3	23.6	35.0	46.4	57.0	65.6	69.3	65.6	57.0	46.4	35.0	23.6	12.3
138	12.4	23.7	35.2	46.5	57.2	65.8	69.6	65.8	57.2	46.5	35.2	23.7	12.4
139	12.6	23.8	35.3	46.6	57.3	66.0	69.8	66.0	57.3	46.6	35.3	23.8	12.6
140	12.7	24.0	35.4	46.8	57.5	66.2	70.0	66.2	57.5	46.8	35.4	24.0	12.7
141	12.8	24.1	35.5	46.9	57.6	66.4	70.2	66.4	57.6	46.9	35.5	24.1	12.8
142	12.9	24.2	35.7	47.0	57.7	66.6	70.4	66.6	57.7	47.0	35.7	24.2	12.9
143	13.1	24.3	35.8	47.1	57.9	66.7	70.6	66.7	57.9	47.1	35.8	24.3	13.1
144	13.2	24.4	35.9	47.2	58.0	66.9	70.8	66.9	58.0	47.2	35.9	24.4	13.2
145	13.3	24.5	36.0	47.4	58.1	67.0	70.9	67.0	58.1	47.4	36.0	24.5	13.3
146	13.4	24.6	36.1	47.5	58.3	67.2	71.1	67.2	58.3	47.5	36.1	24.6	13.4
147	13.5	24.7	36.2	47.6	58.4	67.3	71.3	67.3	58.4	47.6	36.2	24.7	13.5
148	13.6	24.8	36.3	47.7	58.5	67.5	71.4	67.5	58.5	47.7	36.3	24.8	13.6
149	13.7	24.9	36.3	47.7	58.6	67.6	71.6	67.6	58.6	47.7	36.3	24.9	13.7
150	13.8	25.0	36.4	47.8	58.7	67.7	71.7	67.7	58.7	47.8	36.4	25.0	13.8
151	13.9	25.1	36.5	47.9	58.8	67.8	71.9	67.8	58.8	47.9	36.5	25.1	13.9
152	13.9	25.1	36.6	48.0	58.9	68.0	72.0	68.0	58.9	48.0	36.6	25.1	13.9

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 122 TO 152

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
122	11.7	21.3	30.8	39.9	47.7	53.3	55.3	53.3	47.7	39.9	30.8	21.3	11.7
123	11.9	21.5	31.1	40.1	47.9	53.5	55.6	53.5	47.9	40.1	31.1	21.5	11.9
124	12.1	21.7	31.3	40.3	48.2	53.8	55.9	53.8	48.2	40.3	31.3	21.7	12.1
125	12.4	22.0	31.5	40.6	48.5	54.1	56.2	54.1	48.5	40.6	31.5	22.0	12.4
126	12.6	22.2	31.7	40.8	48.7	54.4	56.5	54.4	48.7	40.8	31.7	22.2	12.6
127	12.8	22.4	31.9	41.0	49.0	54.7	56.8	54.7	49.0	41.0	31.9	22.4	12.8
128	13.0	22.6	32.2	41.3	49.2	54.9	57.1	54.9	49.2	41.3	32.2	22.6	13.0
129	13.2	22.8	32.4	41.5	49.4	55.2	57.4	55.2	49.4	41.5	32.4	22.8	13.2
130	13.4	23.0	32.6	41.7	49.7	55.5	57.6	55.5	49.7	41.7	32.6	23.0	13.4
131	13.6	23.2	32.8	41.9	49.9	55.7	57.9	55.7	49.9	41.9	32.8	23.2	13.6
132	13.8	23.4	33.0	42.1	50.1	55.9	58.1	55.9	50.1	42.1	33.0	23.4	13.8
133	14.0	23.5	33.1	42.3	50.3	56.2	58.4	56.2	50.3	42.3	33.1	23.5	14.0
134	14.2	23.7	33.3	42.5	50.6	56.4	58.6	56.4	50.6	42.5	33.3	23.7	14.2
135	14.3	23.9	33.5	42.7	50.8	56.6	58.9	56.6	50.8	42.7	33.5	23.9	14.3
136	14.5	24.1	33.7	42.9	51.0	56.9	59.1	56.9	51.0	42.9	33.7	24.1	14.5
137	14.7	24.2	33.8	43.0	51.2	57.1	59.3	57.1	51.2	43.0	33.8	24.2	14.7
138	14.9	24.4	34.0	43.2	51.3	57.3	59.6	57.3	51.3	43.2	34.0	24.4	14.9
139	15.0	24.6	34.2	43.4	51.5	57.5	59.8	57.5	51.5	43.4	34.2	24.6	15.0
140	15.2	24.7	34.3	43.5	51.7	57.7	60.0	57.7	51.7	43.5	34.3	24.7	15.2
141	15.3	24.9	34.5	43.7	51.9	57.9	60.2	57.9	51.9	43.7	34.5	24.9	15.3
142	15.5	25.0	34.6	43.9	52.1	58.1	60.4	58.1	52.1	43.9	34.6	25.0	15.5
143	15.6	25.1	34.8	44.0	52.2	58.3	60.6	58.3	52.2	44.0	34.8	25.1	15.6
144	15.7	25.3	34.9	44.1	52.4	58.4	60.8	58.4	52.4	44.1	34.9	25.3	15.7
145	15.9	25.4	35.0	44.3	52.5	58.6	60.9	58.6	52.5	44.3	35.0	25.4	15.9
146	16.0	25.5	35.1	44.4	52.7	58.8	61.1	58.8	52.7	44.4	35.1	25.5	16.0
147	16.1	25.7	35.3	44.5	52.8	58.9	61.3	58.9	52.8	44.5	35.3	25.7	16.1
148	16.3	25.8	35.4	44.7	52.9	59.1	61.4	59.1	52.9	44.7	35.4	25.8	16.3
149	16.4	25.9	35.5	44.8	53.1	59.2	61.6	59.2	53.1	44.8	35.5	25.9	16.4
150	16.5	26.0	35.6	44.9	53.2	59.4	61.7	59.4	53.2	44.9	35.6	26.0	16.5
151	16.6	26.1	35.7	45.0	53.3	59.5	61.9	59.5	53.3	45.0	35.7	26.1	16.6
152	16.7	26.2	35.8	45.1	53.4	59.6	62.0	59.6	53.4	45.1	35.8	26.2	16.7

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 122 TO 152

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
122	13.2	20.7	28.0	34.7	40.3	44.0	45.3	44.0	40.3	34.7	28.0	20.7	13.2
123	13.5	21.0	28.3	35.0	40.6	44.3	45.6	44.3	40.6	35.0	28.3	21.0	13.5
124	13.8	21.2	28.6	35.3	40.9	44.6	45.9	44.6	40.9	35.3	28.6	21.2	13.8
125	14.0	21.5	28.8	35.6	41.1	44.9	46.2	44.9	41.1	35.6	28.8	21.5	14.0
126	14.3	21.7	29.1	35.8	41.4	45.2	46.5	45.2	41.4	35.8	29.1	21.7	14.3
127	14.5	22.0	29.3	36.1	41.7	45.5	46.8	45.5	41.7	36.1	29.3	22.0	14.5
128	14.7	22.2	29.6	36.3	41.9	45.7	47.1	45.7	41.9	36.3	29.6	22.2	14.7
129	15.0	22.4	29.8	36.6	42.2	46.0	47.4	46.0	42.2	36.6	29.8	22.4	15.0
130	15.2	22.7	30.0	36.8	42.4	46.3	47.6	46.3	42.4	36.8	30.0	22.7	15.2
131	15.4	22.9	30.3	37.0	42.7	46.5	47.9	46.5	42.7	37.0	30.3	22.9	15.4
132	15.6	23.1	30.5	37.3	42.9	46.8	48.1	46.8	42.9	37.3	30.5	23.1	15.6
133	15.9	23.3	30.7	37.5	43.2	47.0	48.4	47.0	43.2	37.5	30.7	23.3	15.9
134	16.1	23.5	30.9	37.7	43.4	47.3	48.6	47.3	43.4	37.7	30.9	23.5	16.1
135	16.3	23.7	31.1	37.9	43.6	47.5	48.9	47.5	43.6	37.9	31.1	23.7	16.3
136	16.5	23.9	31.3	38.1	43.8	47.7	49.1	47.7	43.8	38.1	31.3	23.9	16.5
137	16.7	24.1	31.5	38.3	44.1	47.9	49.3	47.9	44.1	38.3	31.5	24.1	16.7
138	16.8	24.3	31.7	38.5	44.3	48.2	49.6	48.2	44.3	38.5	31.7	24.3	16.8
139	17.0	24.5	31.9	38.7	44.5	48.4	49.8	48.4	44.5	38.7	31.9	24.5	17.0
140	17.2	24.7	32.1	38.9	44.7	48.6	50.0	48.6	44.7	38.9	32.1	24.7	17.2
141	17.4	24.8	32.2	39.1	44.8	48.8	50.2	48.8	44.8	39.1	32.2	24.8	17.4
142	17.6	25.0	32.4	39.3	45.0	49.0	50.4	49.0	45.0	39.3	32.4	25.0	17.6
143	17.7	25.2	32.6	39.4	45.2	49.2	50.6	49.2	45.2	39.4	32.6	25.2	17.7
144	17.9	25.3	32.7	39.6	45.4	49.3	50.8	49.3	45.4	39.6	32.7	25.3	17.9
145	18.0	25.5	32.9	39.8	45.5	49.5	50.9	49.5	45.5	39.8	32.9	25.5	18.0
146	18.2	25.6	33.0	39.9	45.7	49.7	51.1	49.7	45.7	39.9	33.0	25.6	18.2
147	18.3	25.8	33.2	40.1	45.9	49.8	51.3	49.8	45.9	40.1	33.2	25.8	18.3
148	18.4	25.9	33.3	40.2	46.0	50.0	51.4	50.0	46.0	40.2	33.3	25.9	18.4
149	18.6	26.0	33.4	40.3	46.2	50.1	51.6	50.1	46.2	40.3	33.4	26.0	18.6
150	18.7	26.2	33.6	40.5	46.3	50.3	51.7	50.3	46.3	40.5	33.6	26.2	18.7
151	18.8	26.3	33.7	40.6	46.4	50.4	51.9	50.4	46.4	40.6	33.7	26.3	18.8
152	18.9	26.4	33.8	40.7	46.6	50.6	52.0	50.6	46.6	40.7	33.8	26.4	18.9

APPENDIX F

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 153 TO 182

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 153 TO 182

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
153	7.4	20.7	34.3	48.1	62.0	75.8	87.9	75.8	62.0	48.1	34.3	20.7	7.4
154	7.4	20.8	34.4	48.1	62.0	75.8	87.7	75.8	62.0	48.1	34.4	20.8	7.4
155	7.5	20.8	34.4	48.1	62.0	75.8	87.6	75.8	62.0	48.1	34.4	20.8	7.5
156	7.5	20.8	34.4	48.1	62.0	75.8	87.5	75.8	62.0	48.1	34.4	20.8	7.5
157	7.6	20.9	34.4	48.1	62.0	75.8	87.4	75.8	62.0	48.1	34.4	20.9	7.6
158	7.6	20.9	34.4	48.2	62.0	75.8	87.3	75.8	62.0	48.2	34.4	20.9	7.6
159	7.6	20.9	34.4	48.2	62.0	75.8	87.2	75.8	62.0	48.2	34.4	20.9	7.6
160	7.6	20.9	34.5	48.2	62.0	75.8	87.1	75.8	62.0	48.2	34.5	20.9	7.6
161	7.7	20.9	34.5	48.2	62.0	75.7	87.0	75.7	62.0	48.2	34.5	20.9	7.7
162	7.7	21.0	34.5	48.2	62.0	75.7	87.0	75.7	62.0	48.2	34.5	21.0	7.7
163	7.7	21.0	34.5	48.2	62.0	75.7	86.9	75.7	62.0	48.2	34.5	21.0	7.7
164	7.7	21.0	34.5	48.2	62.0	75.7	86.8	75.7	62.0	48.2	34.5	21.0	7.7
165	7.7	21.0	34.5	48.2	62.0	75.7	86.8	75.7	62.0	48.2	34.5	21.0	7.7
166	7.8	21.0	34.5	48.2	62.0	75.7	86.7	75.7	62.0	48.2	34.5	21.0	7.8
167	7.8	21.0	34.5	48.2	62.0	75.7	86.7	75.7	62.0	48.2	34.5	21.0	7.8
168	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
169	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.9
170	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
171	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
172	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
173	7.8	21.1	34.6	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.6	21.1	7.8
174	7.8	21.1	34.6	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.6	21.1	7.8
175	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
176	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
177	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
178	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
179	7.8	21.0	34.5	48.2	62.0	75.7	86.6	75.7	62.0	48.2	34.5	21.0	7.8
180	7.8	21.0	34.5	48.2	62.0	75.7	86.7	75.7	62.0	48.2	34.5	21.0	7.8
181	7.8	21.0	34.5	48.2	62.0	75.7	86.7	75.7	62.0	48.2	34.5	21.0	7.8
182	7.7	21.0	34.5	48.2	62.0	75.7	86.8	75.7	62.0	48.2	34.5	21.0	7.7

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 153 TO 182

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
153	10.9	23.3	36.1	49.1	62.0	74.4	82.1	74.4	62.0	49.1	36.1	23.3	10.9
154	10.9	23.4	36.2	49.1	62.1	74.5	82.3	74.5	62.1	49.1	36.2	23.4	10.9
155	11.0	23.4	36.2	49.2	62.1	74.6	82.4	74.6	62.1	49.2	36.2	23.4	11.0
156	11.0	23.5	36.3	49.2	62.2	74.6	82.5	74.6	62.2	49.2	36.3	23.5	11.0
157	11.1	23.5	36.3	49.2	62.2	74.7	82.6	74.7	62.2	49.2	36.3	23.5	11.1
158	11.1	23.6	36.3	49.3	62.2	74.7	82.7	74.7	62.2	49.3	36.3	23.6	11.1
159	11.2	23.6	36.4	49.3	62.3	74.8	82.8	74.8	62.3	49.3	36.4	23.6	11.2
160	11.2	23.6	36.4	49.3	62.3	74.8	82.9	74.8	62.3	49.3	36.4	23.6	11.2
161	11.2	23.7	36.4	49.4	62.3	74.9	83.0	74.9	62.3	49.4	36.4	23.7	11.2
162	11.3	23.7	36.5	49.4	62.4	74.9	83.0	74.9	62.4	49.4	36.5	23.7	11.3
163	11.3	23.7	36.5	49.4	62.4	74.9	83.1	74.9	62.4	49.4	36.5	23.7	11.3
164	11.3	23.8	36.5	49.4	62.4	75.0	83.2	75.0	62.4	49.4	36.5	23.8	11.3
165	11.4	23.8	36.5	49.5	62.4	75.0	83.2	75.0	62.4	49.5	36.5	23.8	11.4
166	11.4	23.8	36.5	49.5	62.4	75.0	83.3	75.0	62.4	49.5	36.5	23.8	11.4
167	11.4	23.8	36.6	49.5	62.5	75.0	83.3	75.0	62.5	49.5	36.6	23.8	11.4
168	11.4	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.4
169	11.4	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.4
170	11.5	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.5
171	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
172	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
173	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
174	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
175	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
176	11.5	23.9	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.9	11.5
177	11.5	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.5
178	11.4	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.4
179	11.4	23.8	36.6	49.5	62.5	75.1	83.4	75.1	62.5	49.5	36.6	23.8	11.4
180	11.4	23.8	36.6	49.5	62.5	75.0	83.3	75.0	62.5	49.5	36.6	23.8	11.4
181	11.4	23.8	36.5	49.5	62.4	75.0	83.3	75.0	62.4	49.5	36.5	23.8	11.4
182	11.4	23.8	36.5	49.5	62.4	75.0	83.2	75.0	62.4	49.5	36.5	23.8	11.4

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 153 TO 182

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
153	14.0	25.2	36.7	48.1	59.0	68.1	72.1	68.1	59.0	48.1	36.7	25.2	14.0
154	14.1	25.3	36.7	48.1	59.0	68.2	72.3	68.2	59.0	48.1	36.7	25.3	14.1
155	14.2	25.3	36.8	48.2	59.1	68.3	72.4	68.3	59.1	48.2	36.8	25.3	14.2
156	14.2	25.4	36.9	48.3	59.2	68.4	72.5	68.4	59.2	48.3	36.9	25.4	14.2
157	14.3	25.5	36.9	48.3	59.3	68.5	72.6	68.5	59.3	48.3	36.9	25.5	14.3
158	14.4	25.5	37.0	48.4	59.3	68.5	72.7	68.5	59.3	48.4	37.0	25.5	14.4
159	14.4	25.6	37.0	48.5	59.4	68.6	72.8	68.6	59.4	48.5	37.0	25.6	14.4
160	14.5	25.6	37.1	48.5	59.4	68.7	72.9	68.7	59.4	48.5	37.1	25.6	14.5
161	14.5	25.7	37.1	48.5	59.5	68.8	73.0	68.8	59.5	48.5	37.1	25.7	14.5
162	14.6	25.7	37.2	48.6	59.5	68.8	73.0	68.8	59.5	48.6	37.2	25.7	14.6
163	14.6	25.8	37.2	48.6	59.6	68.9	73.1	68.9	59.6	48.6	37.2	25.8	14.6
164	14.6	25.8	37.2	48.7	59.6	68.9	73.2	68.9	59.6	48.7	37.2	25.8	14.6
165	14.7	25.8	37.3	48.7	59.7	69.0	73.2	69.0	59.7	48.7	37.3	25.8	14.7
166	14.7	25.9	37.3	48.7	59.7	69.0	73.3	69.0	59.7	48.7	37.3	25.9	14.7
167	14.7	25.9	37.3	48.7	59.7	69.1	73.3	69.1	59.7	48.7	37.3	25.9	14.7
168	14.8	25.9	37.3	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.3	25.9	14.8
169	14.8	25.9	37.3	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.3	25.9	14.8
170	14.8	25.9	37.4	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.4	25.9	14.8
171	14.8	25.9	37.4	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.4	25.9	14.8
172	14.8	25.9	37.4	48.8	59.8	69.2	73.4	69.2	59.8	48.8	37.4	25.9	14.8
173	14.8	26.0	37.4	48.8	59.8	69.2	73.4	69.2	59.8	48.8	37.4	26.0	14.8
174	14.8	26.0	37.4	48.8	59.8	69.2	73.4	69.2	59.8	48.8	37.4	26.0	14.8
175	14.8	25.9	37.4	48.8	59.8	69.2	73.4	69.2	59.8	48.8	37.4	25.9	14.8
176	14.8	25.9	37.4	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.4	25.9	14.8
177	14.8	25.9	37.4	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.4	25.9	14.8
178	14.8	25.9	37.3	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.3	25.9	14.8
179	14.8	25.9	37.3	48.8	59.8	69.1	73.4	69.1	59.8	48.8	37.3	25.9	14.8
180	14.7	25.9	37.3	48.7	59.7	69.1	73.3	69.1	59.7	48.7	37.3	25.9	14.7
181	14.7	25.9	37.3	48.7	59.7	69.0	73.3	69.0	59.7	48.7	37.3	25.9	14.7
182	14.7	25.8	37.3	48.7	59.7	69.0	73.2	69.0	59.7	48.7	37.3	25.8	14.7

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 153 TO 182

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
153	16.8	26.3	35.9	45.2	53.5	59.7	62.1	59.7	53.5	45.2	35.9	26.3	16.8
154	16.9	26.4	36.0	45.3	53.7	59.9	62.3	59.9	53.7	45.3	36.0	26.4	16.9
155	17.0	26.5	36.1	45.4	53.8	60.0	62.4	60.0	53.8	45.4	36.1	26.5	17.0
156	17.0	26.5	36.2	45.5	53.8	60.1	62.5	60.1	53.8	45.5	36.2	26.5	17.0
157	17.1	26.6	36.2	45.6	53.9	60.2	62.6	60.2	53.9	45.6	36.2	26.6	17.1
158	17.2	26.7	36.3	45.6	54.0	60.3	62.7	60.3	54.0	45.6	36.3	26.7	17.2
159	17.3	26.8	36.4	45.7	54.1	60.4	62.8	60.4	54.1	45.7	36.4	26.8	17.3
160	17.3	26.8	36.4	45.8	54.2	60.4	62.9	60.4	54.2	45.8	36.4	26.8	17.3
161	17.4	26.9	36.5	45.8	54.2	60.5	63.0	60.5	54.2	45.8	36.5	26.9	17.4
162	17.4	26.9	36.5	45.9	54.3	60.6	63.0	60.6	54.3	45.9	36.5	26.9	17.4
163	17.5	27.0	36.6	45.9	54.4	60.7	63.1	60.7	54.4	45.9	36.6	27.0	17.5
164	17.5	27.0	36.6	46.0	54.4	60.7	63.2	60.7	54.4	46.0	36.6	27.0	17.5
165	17.6	27.1	36.7	46.0	54.4	60.8	63.2	60.8	54.4	46.0	36.7	27.1	17.6
166	17.6	27.1	36.7	46.1	54.5	60.8	63.3	60.8	54.5	46.1	36.7	27.1	17.6
167	17.6	27.1	36.7	46.1	54.5	60.9	63.3	60.9	54.5	46.1	36.7	27.1	17.6
168	17.7	27.2	36.8	46.1	54.6	60.9	63.4	60.9	54.6	46.1	36.8	27.2	17.7
169	17.7	27.2	36.8	46.2	54.6	60.9	63.4	60.9	54.6	46.2	36.8	27.2	17.7
170	17.7	27.2	36.8	46.2	54.6	60.9	63.4	60.9	54.6	46.2	36.8	27.2	17.7
171	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
172	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
173	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
174	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
175	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
176	17.7	27.2	36.8	46.2	54.6	61.0	63.4	61.0	54.6	46.2	36.8	27.2	17.7
177	17.7	27.2	36.8	46.2	54.6	60.9	63.4	60.9	54.6	46.2	36.8	27.2	17.7
178	17.7	27.2	36.8	46.2	54.6	60.9	63.4	60.9	54.6	46.2	36.8	27.2	17.7
179	17.7	27.2	36.8	46.1	54.6	60.9	63.4	60.9	54.6	46.1	36.8	27.2	17.7
180	17.6	27.1	36.7	46.1	54.5	60.9	63.3	60.9	54.5	46.1	36.7	27.1	17.6
181	17.6	27.1	36.7	46.1	54.5	60.8	63.3	60.8	54.5	46.1	36.7	27.1	17.6
182	17.6	27.1	36.7	46.0	54.4	60.8	63.2	60.8	54.4	46.0	36.7	27.1	17.6

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 153 TO 182

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
153	19.1	26.5	33.9	40.8	46.7	50.7	52.1	50.7	46.7	40.8	33.9	26.5	19.1
154	19.2	26.6	34.0	40.9	46.8	50.8	52.3	50.8	46.8	40.9	34.0	26.6	19.2
155	19.3	26.7	34.1	41.0	46.9	50.9	52.4	50.9	46.9	41.0	34.1	26.7	19.3
156	19.4	26.8	34.2	41.1	47.0	51.0	52.5	51.0	47.0	41.1	34.2	26.8	19.4
157	19.4	26.9	34.3	41.2	47.1	51.1	52.6	51.1	47.1	41.2	34.3	26.9	19.4
158	19.5	27.0	34.4	41.3	47.2	51.2	52.7	51.2	47.2	41.3	34.4	27.0	19.5
159	19.6	27.1	34.5	41.4	47.3	51.3	52.8	51.3	47.3	41.4	34.5	27.1	19.6
160	19.7	27.1	34.5	41.5	47.4	51.4	52.9	51.4	47.4	41.5	34.5	27.1	19.7
161	19.7	27.2	34.6	41.6	47.4	51.5	53.0	51.5	47.4	41.6	34.6	27.2	19.7
162	19.8	27.3	34.7	41.6	47.5	51.6	53.0	51.6	47.5	41.6	34.7	27.3	19.8
163	19.9	27.3	34.7	41.7	47.6	51.6	53.1	51.6	47.6	41.7	34.7	27.3	19.9
164	19.9	27.4	34.8	41.7	47.6	51.7	53.2	51.7	47.6	41.7	34.8	27.4	19.9
165	20.0	27.4	34.8	41.8	47.7	51.7	53.2	51.7	47.7	41.8	34.8	27.4	20.0
166	20.0	27.5	34.9	41.8	47.7	51.8	53.3	51.8	47.7	41.8	34.9	27.5	20.0
167	20.0	27.5	34.9	41.9	47.8	51.8	53.3	51.8	47.8	41.9	34.9	27.5	20.0
168	20.1	27.5	34.9	41.9	47.8	51.9	53.4	51.9	47.8	41.9	34.9	27.5	20.1
169	20.1	27.5	35.0	41.9	47.8	51.9	53.4	51.9	47.8	41.9	35.0	27.5	20.1
170	20.1	27.6	35.0	42.0	47.9	51.9	53.4	51.9	47.9	42.0	35.0	27.6	20.1
171	20.1	27.6	35.0	42.0	47.9	51.9	53.4	51.9	47.9	42.0	35.0	27.6	20.1
172	20.1	27.6	35.0	42.0	47.9	52.0	53.4	52.0	47.9	42.0	35.0	27.6	20.1
173	20.2	27.6	35.0	42.0	47.9	52.0	53.4	52.0	47.9	42.0	35.0	27.6	20.2
174	20.2	27.6	35.0	42.0	47.9	52.0	53.4	52.0	47.9	42.0	35.0	27.6	20.2
175	20.1	27.6	35.0	42.0	47.9	52.0	53.4	52.0	47.9	42.0	35.0	27.6	20.1
176	20.1	27.6	35.0	42.0	47.9	51.9	53.4	51.9	47.9	42.0	35.0	27.6	20.1
177	20.1	27.6	35.0	42.0	47.9	51.9	53.4	51.9	47.9	42.0	35.0	27.6	20.1
178	20.1	27.5	35.0	41.9	47.8	51.9	53.4	51.9	47.8	41.9	35.0	27.5	20.1
179	20.1	27.5	34.9	41.9	47.8	51.9	53.4	51.9	47.8	41.9	34.9	27.5	20.1
180	20.0	27.5	34.9	41.9	47.8	51.8	53.3	51.8	47.8	41.9	34.9	27.5	20.0
181	20.0	27.5	34.9	41.8	47.7	51.8	53.3	51.8	47.7	41.8	34.9	27.5	20.0
182	20.0	27.4	34.8	41.8	47.7	51.7	53.2	51.7	47.7	41.8	34.8	27.4	20.0

APPENDIX G

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 183 TO 213

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 183 TO 213

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
183	7.7	21.0	34.5	48.2	62.0	75.7	86.8	75.7	62.0	48.2	34.5	21.0	7.7
184	7.7	21.0	34.5	48.2	62.0	75.7	86.9	75.7	62.0	48.2	34.5	21.0	7.7
185	7.7	21.0	34.5	48.2	62.0	75.7	87.0	75.7	62.0	48.2	34.5	21.0	7.7
186	7.7	20.9	34.5	48.2	62.0	75.7	87.0	75.7	62.0	48.2	34.5	20.9	7.7
187	7.6	20.9	34.5	48.2	62.0	75.8	87.1	75.8	62.0	48.2	34.5	20.9	7.6
188	7.6	20.9	34.4	48.2	62.0	75.8	87.2	75.8	62.0	48.2	34.4	20.9	7.6
189	7.6	20.9	34.4	48.2	62.0	75.8	87.3	75.8	62.0	48.2	34.4	20.9	7.6
190	7.6	20.9	34.4	48.1	62.0	75.8	87.4	75.8	62.0	48.1	34.4	20.9	7.6
191	7.5	20.8	34.4	48.1	62.0	75.8	87.5	75.8	62.0	48.1	34.4	20.8	7.5
192	7.5	20.8	34.4	48.1	62.0	75.8	87.6	75.8	62.0	48.1	34.4	20.8	7.5
193	7.4	20.8	34.4	48.1	62.0	75.8	87.7	75.8	62.0	48.1	34.4	20.8	7.4
194	7.4	20.7	34.3	48.1	62.0	75.8	87.9	75.8	62.0	48.1	34.3	20.7	7.4
195	7.4	20.7	34.3	48.1	62.0	75.9	88.0	75.9	62.0	48.1	34.3	20.7	7.4
196	7.3	20.7	34.3	48.1	62.0	75.9	88.1	75.9	62.0	48.1	34.3	20.7	7.3
197	7.3	20.6	34.3	48.1	62.0	75.9	88.3	75.9	62.0	48.1	34.3	20.6	7.3
198	7.2	20.6	34.2	48.0	62.0	75.9	88.4	75.9	62.0	48.0	34.2	20.6	7.2
199	7.2	20.6	34.2	48.0	61.9	75.9	88.6	75.9	61.9	48.0	34.2	20.6	7.2
200	7.1	20.5	34.2	48.0	61.9	75.9	88.7	75.9	61.9	48.0	34.2	20.5	7.1
201	7.1	20.5	34.2	48.0	61.9	75.9	88.9	75.9	61.9	48.0	34.2	20.5	7.1
202	7.0	20.4	34.1	48.0	61.9	75.9	89.1	75.9	61.9	48.0	34.1	20.4	7.0
203	7.0	20.4	34.1	47.9	61.9	75.9	89.2	75.9	61.9	47.9	34.1	20.4	7.0
204	6.9	20.4	34.1	47.9	61.9	75.9	89.4	75.9	61.9	47.9	34.1	20.4	6.9
205	6.8	20.3	34.0	47.9	61.9	75.9	89.6	75.9	61.9	47.9	34.0	20.3	6.8
206	6.8	20.3	34.0	47.9	61.9	75.9	89.8	75.9	61.9	47.9	34.0	20.3	6.8
207	6.7	20.2	33.9	47.8	61.8	75.9	90.0	75.9	61.8	47.8	33.9	20.2	6.7
208	6.6	20.2	33.9	47.8	61.8	75.9	89.8	75.9	61.8	47.8	33.9	20.2	6.6
209	6.6	20.1	33.9	47.8	61.8	75.9	89.6	75.9	61.8	47.8	33.9	20.1	6.6
210	6.5	20.0	33.8	47.8	61.8	75.9	89.3	75.9	61.8	47.8	33.8	20.0	6.5
211	6.4	20.0	33.8	47.7	61.8	75.8	89.1	75.8	61.8	47.7	33.8	20.0	6.4
212	6.4	19.9	33.7	47.7	61.7	75.8	88.9	75.8	61.7	47.7	33.7	19.9	6.4
213	6.3	19.9	33.7	47.6	61.7	75.8	88.6	75.8	61.7	47.6	33.7	19.9	6.3

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 183 TO 213

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
183	11.3	23.8	36.5	49.4	62.4	75.0	83.2	75.0	62.4	49.4	36.5	23.8	11.3
184	11.3	23.7	36.5	49.4	62.4	74.9	83.1	74.9	62.4	49.4	36.5	23.7	11.3
185	11.3	23.7	36.5	49.4	62.4	74.9	83.0	74.9	62.4	49.4	36.5	23.7	11.3
186	11.2	23.7	36.4	49.4	62.3	74.9	83.0	74.9	62.3	49.4	36.4	23.7	11.2
187	11.2	23.6	36.4	49.3	62.3	74.8	82.9	74.8	62.3	49.3	36.4	23.6	11.2
188	11.2	23.6	36.4	49.3	62.3	74.8	82.8	74.8	62.3	49.3	36.4	23.6	11.2
189	11.1	23.6	36.3	49.3	62.2	74.7	82.7	74.7	62.2	49.3	36.3	23.6	11.1
190	11.1	23.5	36.3	49.2	62.2	74.7	82.6	74.7	62.2	49.2	36.3	23.5	11.1
191	11.0	23.5	36.3	49.2	62.2	74.6	82.5	74.6	62.2	49.2	36.3	23.5	11.0
192	11.0	23.4	36.2	49.2	62.1	74.6	82.4	74.6	62.1	49.2	36.2	23.4	11.0
193	10.9	23.4	36.2	49.1	62.1	74.5	82.3	74.5	62.1	49.1	36.2	23.4	10.9
194	10.9	23.3	36.1	49.1	62.0	74.4	82.1	74.4	62.0	49.1	36.1	23.3	10.9
195	10.8	23.3	36.1	49.0	62.0	74.4	82.0	74.4	62.0	49.0	36.1	23.3	10.8
196	10.7	23.2	36.0	49.0	61.9	74.3	81.9	74.3	61.9	49.0	36.0	23.2	10.7
197	10.7	23.2	36.0	48.9	61.9	74.2	81.7	74.2	61.9	48.9	36.0	23.2	10.7
198	10.6	23.1	35.9	48.9	61.8	74.1	81.6	74.1	61.8	48.9	35.9	23.1	10.6
199	10.5	23.0	35.9	48.8	61.7	74.0	81.4	74.0	61.7	48.8	35.9	23.0	10.5
200	10.5	23.0	35.8	48.8	61.7	73.9	81.3	73.9	61.7	48.8	35.8	23.0	10.5
201	10.4	22.9	35.7	48.7	61.6	73.8	81.1	73.8	61.6	48.7	35.7	22.9	10.4
202	10.3	22.8	35.7	48.6	61.5	73.7	80.9	73.7	61.5	48.6	35.7	22.8	10.3
203	10.2	22.8	35.6	48.6	61.5	73.6	80.8	73.6	61.5	48.6	35.6	22.8	10.2
204	10.1	22.7	35.5	48.5	61.4	73.5	80.6	73.5	61.4	48.5	35.5	22.7	10.1
205	10.0	22.6	35.5	48.4	61.3	73.4	80.4	73.4	61.3	48.4	35.5	22.6	10.0
206	9.9	22.5	35.4	48.4	61.2	73.3	80.2	73.3	61.2	48.4	35.4	22.5	9.9
207	9.8	22.4	35.3	48.3	61.1	73.1	80.0	73.1	61.1	48.3	35.3	22.4	9.8
208	9.7	22.3	35.2	48.2	61.0	73.0	79.8	73.0	61.0	48.2	35.2	22.3	9.7
209	9.6	22.2	35.1	48.1	60.9	72.9	79.6	72.9	60.9	48.1	35.1	22.2	9.6
210	9.5	22.1	35.0	48.0	60.8	72.7	79.3	72.7	60.8	48.0	35.0	22.1	9.5
211	9.4	22.1	34.9	47.9	60.7	72.6	79.1	72.6	60.7	47.9	34.9	22.1	9.4
212	9.3	22.0	34.9	47.8	60.6	72.4	78.9	72.4	60.6	47.8	34.9	22.0	9.3
213	9.2	21.8	34.8	47.7	60.5	72.3	78.6	72.3	60.5	47.7	34.8	21.8	9.2

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 183 TO 213

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
183	14.6	25.8	37.2	48.7	59.6	68.9	73.2	68.9	59.6	48.7	37.2	25.8	14.6
184	14.6	25.8	37.2	48.6	59.6	68.9	73.1	68.9	59.6	48.6	37.2	25.8	14.6
185	14.6	25.7	37.2	48.6	59.5	68.8	73.0	68.8	59.5	48.6	37.2	25.7	14.6
186	14.5	25.7	37.1	48.5	59.5	68.8	73.0	68.8	59.5	48.5	37.1	25.7	14.5
187	14.5	25.6	37.1	48.5	59.4	68.7	72.9	68.7	59.4	48.5	37.1	25.6	14.5
188	14.4	25.6	37.0	48.5	59.4	68.6	72.8	68.6	59.4	48.5	37.0	25.6	14.4
189	14.4	25.5	37.0	48.4	59.3	68.5	72.7	68.5	59.3	48.4	37.0	25.5	14.4
190	14.3	25.5	36.9	48.3	59.3	68.5	72.6	68.5	59.3	48.3	36.9	25.5	14.3
191	14.2	25.4	36.9	48.3	59.2	68.4	72.5	68.4	59.2	48.3	36.9	25.4	14.2
192	14.2	25.3	36.8	48.2	59.1	68.3	72.4	68.3	59.1	48.2	36.8	25.3	14.2
193	14.1	25.3	36.7	48.1	59.0	68.2	72.3	68.2	59.0	48.1	36.7	25.3	14.1
194	14.0	25.2	36.7	48.1	59.0	68.1	72.1	68.1	59.0	48.1	36.7	25.2	14.0
195	13.9	25.1	36.6	48.0	58.9	68.0	72.0	68.0	58.9	48.0	36.6	25.1	13.9
196	13.9	25.1	36.5	47.9	58.8	67.8	71.9	67.8	58.8	47.9	36.5	25.1	13.9
197	13.8	25.0	36.4	47.8	58.7	67.7	71.7	67.7	58.7	47.8	36.4	25.0	13.8
198	13.7	24.9	36.3	47.7	58.6	67.6	71.6	67.6	58.6	47.7	36.3	24.9	13.7
199	13.6	24.8	36.3	47.7	58.5	67.5	71.4	67.5	58.5	47.7	36.3	24.8	13.6
200	13.5	24.7	36.2	47.6	58.4	67.3	71.3	67.3	58.4	47.6	36.2	24.7	13.5
201	13.4	24.6	36.1	47.5	58.3	67.2	71.1	67.2	58.3	47.5	36.1	24.6	13.4
202	13.3	24.5	36.0	47.4	58.1	67.0	70.9	67.0	58.1	47.4	36.0	24.5	13.3
203	13.2	24.4	35.9	47.2	58.0	66.9	70.8	66.9	58.0	47.2	35.9	24.4	13.2
204	13.1	24.3	35.8	47.1	57.9	66.7	70.6	66.7	57.9	47.1	35.8	24.3	13.1
205	12.9	24.2	35.7	47.0	57.7	66.6	70.4	66.6	57.7	47.0	35.7	24.2	12.9
206	12.8	24.1	35.5	46.9	57.6	66.4	70.2	66.4	57.6	46.9	35.5	24.1	12.8
207	12.7	24.0	35.4	46.8	57.5	66.2	70.0	66.2	57.5	46.8	35.4	24.0	12.7
208	12.6	23.8	35.3	46.6	57.3	66.0	69.8	66.0	57.3	46.6	35.3	23.8	12.6
209	12.4	23.7	35.2	46.5	57.2	65.8	69.6	65.8	57.2	46.5	35.2	23.7	12.4
210	12.3	23.6	35.0	46.4	57.0	65.6	69.3	65.6	57.0	46.4	35.0	23.6	12.3
211	12.1	23.4	34.9	46.2	56.9	65.4	69.1	65.4	56.9	46.2	34.9	23.4	12.1
212	12.0	23.3	34.8	46.1	56.7	65.2	68.9	65.2	56.7	46.1	34.8	23.3	12.0
213	11.9	23.2	34.6	45.9	56.5	65.0	68.6	65.0	56.5	45.9	34.6	23.2	11.9

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 183 TO 213

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
183	17.5	27.0	36.6	46.0	54.4	60.7	63.2	60.7	54.4	46.0	36.6	27.0	17.5
184	17.5	27.0	36.6	45.9	54.4	60.7	63.1	60.7	54.4	45.9	36.6	27.0	17.5
185	17.4	26.9	36.5	45.9	54.3	60.6	63.0	60.6	54.3	45.9	36.5	26.9	17.4
186	17.4	26.9	36.5	45.8	54.2	60.5	63.0	60.5	54.2	45.8	36.5	26.9	17.4
187	17.3	26.8	36.4	45.8	54.2	60.4	62.9	60.4	54.2	45.8	36.4	26.8	17.3
188	17.3	26.8	36.4	45.7	54.1	60.4	62.8	60.4	54.1	45.7	36.4	26.8	17.3
189	17.2	26.7	36.3	45.6	54.0	60.3	62.7	60.3	54.0	45.6	36.3	26.7	17.2
190	17.1	26.6	36.2	45.6	53.9	60.2	62.6	60.2	53.9	45.6	36.2	26.6	17.1
191	17.0	26.5	36.2	45.5	53.8	60.1	62.5	60.1	53.8	45.5	36.2	26.5	17.0
192	17.0	26.5	36.1	45.4	53.8	60.0	62.4	60.0	53.8	45.4	36.1	26.5	17.0
193	16.9	26.4	36.0	45.3	53.7	59.9	62.3	59.9	53.7	45.3	36.0	26.4	16.9
194	16.8	26.3	35.9	45.2	53.5	59.7	62.1	59.7	53.5	45.2	35.9	26.3	16.8
195	16.7	26.2	35.8	45.1	53.4	59.6	62.0	59.6	53.4	45.1	35.8	26.2	16.7
196	16.6	26.1	35.7	45.0	53.3	59.5	61.9	59.5	53.3	45.0	35.7	26.1	16.6
197	16.5	26.0	35.6	44.9	53.2	59.4	61.7	59.4	53.2	44.9	35.6	26.0	16.5
198	16.4	25.9	35.5	44.8	53.1	59.2	61.6	59.2	53.1	44.8	35.5	25.9	16.4
199	16.3	25.8	35.4	44.7	52.9	59.1	61.4	59.1	52.9	44.7	35.4	25.8	16.3
200	16.1	25.7	35.3	44.5	52.8	58.9	61.3	58.9	52.8	44.5	35.3	25.7	16.1
201	16.0	25.5	35.1	44.4	52.7	58.8	61.1	58.8	52.7	44.4	35.1	25.5	16.0
202	15.9	25.4	35.0	44.3	52.5	58.6	60.9	58.6	52.5	44.3	35.0	25.4	15.9
203	15.7	25.3	34.9	44.1	52.4	58.4	60.8	58.4	52.4	44.1	34.9	25.3	15.7
204	15.6	25.1	34.8	44.0	52.2	58.3	60.6	58.3	52.2	44.0	34.8	25.1	15.6
205	15.5	25.0	34.6	43.9	52.1	58.1	60.4	58.1	52.1	43.9	34.6	25.0	15.5
206	15.3	24.9	34.5	43.7	51.9	57.9	60.2	57.9	51.9	43.7	34.5	24.9	15.3
207	15.2	24.7	34.3	43.5	51.7	57.7	60.0	57.7	51.7	43.5	34.3	24.7	15.2
208	15.0	24.6	34.2	43.4	51.5	57.5	59.8	57.5	51.5	43.4	34.2	24.6	15.0
209	14.9	24.4	34.0	43.2	51.3	57.3	59.6	57.3	51.3	43.2	34.0	24.4	14.9
210	14.7	24.2	33.8	43.0	51.2	57.1	59.3	57.1	51.2	43.0	33.8	24.2	14.7
211	14.5	24.1	33.7	42.9	51.0	56.9	59.1	56.9	51.0	42.9	33.7	24.1	14.5
212	14.3	23.9	33.5	42.7	50.8	56.6	58.9	56.6	50.8	42.7	33.5	23.9	14.3
213	14.2	23.7	33.3	42.5	50.6	56.4	58.6	56.4	50.6	42.5	33.3	23.7	14.2

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 183 TO 213

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
183	19.9	27.4	34.8	41.7	47.6	51.7	53.2	51.7	47.6	41.7	34.8	27.4	19.9
184	19.9	27.3	34.7	41.7	47.6	51.6	53.1	51.6	47.6	41.7	34.7	27.3	19.9
185	19.8	27.3	34.7	41.6	47.5	51.6	53.0	51.6	47.5	41.6	34.7	27.3	19.8
186	19.7	27.2	34.6	41.6	47.4	51.5	53.0	51.5	47.4	41.6	34.6	27.2	19.7
187	19.7	27.1	34.5	41.5	47.4	51.4	52.9	51.4	47.4	41.5	34.5	27.1	19.7
188	19.6	27.1	34.5	41.4	47.3	51.3	52.8	51.3	47.3	41.4	34.5	27.1	19.6
189	19.5	27.0	34.4	41.3	47.2	51.2	52.7	51.2	47.2	41.3	34.4	27.0	19.5
190	19.4	26.9	34.3	41.2	47.1	51.1	52.6	51.1	47.1	41.2	34.3	26.9	19.4
191	19.4	26.8	34.2	41.1	47.0	51.0	52.5	51.0	47.0	41.1	34.2	26.8	19.4
192	19.3	26.7	34.1	41.0	46.9	50.9	52.4	50.9	46.9	41.0	34.1	26.7	19.3
193	19.2	26.6	34.0	40.9	46.8	50.8	52.3	50.8	46.8	40.9	34.0	26.6	19.2
194	19.1	26.5	33.9	40.8	46.7	50.7	52.1	50.7	46.7	40.8	33.9	26.5	19.1
195	18.9	26.4	33.8	40.7	46.6	50.6	52.0	50.6	46.6	40.7	33.8	26.4	18.9
196	18.8	26.3	33.7	40.6	46.4	50.4	51.9	50.4	46.4	40.6	33.7	26.3	18.8
197	18.7	26.2	33.6	40.5	46.3	50.3	51.7	50.3	46.3	40.5	33.6	26.2	18.7
198	18.6	26.0	33.4	40.3	46.2	50.1	51.6	50.1	46.2	40.3	33.4	26.0	18.6
199	18.4	25.9	33.3	40.2	46.0	50.0	51.4	50.0	46.0	40.2	33.3	25.9	18.4
200	18.3	25.8	33.2	40.1	45.9	49.8	51.3	49.8	45.9	40.1	33.2	25.8	18.3
201	18.2	25.6	33.0	39.9	45.7	49.7	51.1	49.7	45.7	39.9	33.0	25.6	18.2
202	18.0	25.5	32.9	39.8	45.5	49.5	50.9	49.5	45.5	39.8	32.9	25.5	18.0
203	17.9	25.3	32.7	39.6	45.4	49.3	50.8	49.3	45.4	39.6	32.7	25.3	17.9
204	17.7	25.2	32.6	39.4	45.2	49.2	50.6	49.2	45.2	39.4	32.6	25.2	17.7
205	17.6	25.0	32.4	39.3	45.0	49.0	50.4	49.0	45.0	39.3	32.4	25.0	17.6
206	17.4	24.8	32.2	39.1	44.8	48.8	50.2	48.8	44.8	39.1	32.2	24.8	17.4
207	17.2	24.7	32.1	38.9	44.7	48.6	50.0	48.6	44.7	38.9	32.1	24.7	17.2
208	17.0	24.5	31.9	38.7	44.5	48.4	49.8	48.4	44.5	38.7	31.9	24.5	17.0
209	16.8	24.3	31.7	38.5	44.3	48.2	49.6	48.2	44.3	38.5	31.7	24.3	16.8
210	16.7	24.1	31.5	38.3	44.1	47.9	49.3	47.9	44.1	38.3	31.5	24.1	16.7
211	16.5	23.9	31.3	38.1	43.8	47.7	49.1	47.7	43.8	38.1	31.3	23.9	16.5
212	16.3	23.7	31.1	37.9	43.6	47.5	48.9	47.5	43.6	37.9	31.1	23.7	16.3
213	16.1	23.5	30.9	37.7	43.4	47.3	48.6	47.3	43.4	37.7	30.9	23.5	16.1

APPENDIX H

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 214 TO 244

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 214 TO 244

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
214	6.2	19.8	33.6	47.6	61.7	75.7	88.4	75.7	61.7	47.6	33.6	19.8	6.2
215	6.1	19.7	33.6	47.6	61.6	75.7	88.1	75.7	61.6	47.6	33.6	19.7	6.1
216	6.0	19.7	33.5	47.5	61.6	75.7	87.9	75.7	61.6	47.5	33.5	19.7	6.0
217	5.9	19.6	33.5	47.5	61.5	75.6	87.6	75.6	61.5	47.5	33.5	19.6	5.9
218	5.9	19.5	33.4	47.4	61.5	75.6	87.4	75.6	61.5	47.4	33.4	19.5	5.9
219	5.8	19.4	33.3	47.4	61.4	75.5	87.1	75.5	61.4	47.4	33.3	19.4	5.8
220	5.7	19.4	33.3	47.3	61.4	75.4	86.8	75.4	61.4	47.3	33.3	19.4	5.7
221	5.6	19.3	33.2	47.2	61.3	75.3	86.5	75.3	61.3	47.2	33.2	19.3	5.6
222	5.5	19.2	33.1	47.2	61.3	75.3	86.2	75.3	61.3	47.2	33.1	19.2	5.5
223	5.4	19.1	33.1	47.1	61.2	75.2	85.9	75.2	61.2	47.1	33.1	19.1	5.4
224	5.3	19.0	33.0	47.1	61.1	75.1	85.6	75.1	61.1	47.1	33.0	19.0	5.3
225	5.2	19.0	32.9	47.0	61.1	75.0	85.3	75.0	61.1	47.0	32.9	19.0	5.2
226	5.1	18.9	32.8	46.9	61.0	74.9	85.0	74.9	61.0	46.9	32.8	18.9	5.1
227	5.0	18.8	32.8	46.8	60.9	74.7	84.7	74.7	60.9	46.8	32.8	18.8	5.0
228	4.9	18.7	32.7	46.8	60.8	74.6	84.4	74.6	60.8	46.8	32.7	18.7	4.9
229	4.8	18.6	32.6	46.7	60.7	74.5	84.1	74.5	60.7	46.7	32.6	18.6	4.8
230	4.7	18.5	32.5	46.6	60.7	74.3	83.7	74.3	60.7	46.6	32.5	18.5	4.7
231	4.5	18.4	32.4	46.5	60.6	74.2	83.4	74.2	60.6	46.5	32.4	18.4	4.5
232	4.4	18.3	32.3	46.4	60.5	74.0	83.0	74.0	60.5	46.4	32.3	18.3	4.4
233	4.3	18.2	32.2	46.3	60.4	73.9	82.7	73.9	60.4	46.3	32.2	18.2	4.3
234	4.2	18.1	32.1	46.2	60.2	73.7	82.4	73.7	60.2	46.2	32.1	18.1	4.2
235	4.1	18.0	32.1	46.1	60.1	73.5	82.0	73.5	60.1	46.1	32.1	18.0	4.1
236	4.0	17.9	32.0	46.0	60.0	73.3	81.6	73.3	60.0	46.0	32.0	17.9	4.0
237	3.8	17.8	31.8	45.9	59.9	73.1	81.3	73.1	59.9	45.9	31.8	17.8	3.8
238	3.7	17.7	31.7	45.8	59.7	72.9	80.9	72.9	59.7	45.8	31.7	17.7	3.7
239	3.6	17.6	31.6	45.7	59.6	72.7	80.5	72.7	59.6	45.7	31.6	17.6	3.6
240	3.5	17.4	31.5	45.6	59.5	72.5	80.2	72.5	59.5	45.6	31.5	17.4	3.5
241	3.3	17.3	31.4	45.5	59.3	72.3	79.8	72.3	59.3	45.5	31.4	17.3	3.3
242	3.2	17.2	31.3	45.3	59.2	72.1	79.4	72.1	59.2	45.3	31.3	17.2	3.2
243	3.1	17.1	31.2	45.2	59.0	71.8	79.0	71.8	59.0	45.2	31.2	17.1	3.1
244	2.9	17.0	31.1	45.1	58.9	71.6	78.6	71.6	58.9	45.1	31.1	17.0	2.9

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 214 TO 244

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
214	9.1	21.7	34.7	47.6	60.4	72.1	78.4	72.1	60.4	47.6	34.7	21.7	9.1
215	9.0	21.6	34.6	47.5	60.3	71.9	78.1	71.9	60.3	47.5	34.6	21.6	9.0
216	8.8	21.5	34.4	47.4	60.1	71.7	77.9	71.7	60.1	47.4	34.4	21.5	8.8
217	8.7	21.4	34.3	47.3	60.0	71.6	77.6	71.6	60.0	47.3	34.3	21.4	8.7
218	8.6	21.3	34.2	47.2	59.9	71.4	77.4	71.4	59.9	47.2	34.2	21.3	8.6
219	8.4	21.2	34.1	47.1	59.7	71.2	77.1	71.2	59.7	47.1	34.1	21.2	8.4
220	8.3	21.0	34.0	47.0	59.6	71.0	76.8	71.0	59.6	47.0	34.0	21.0	8.3
221	8.2	20.9	33.9	46.8	59.5	70.8	76.5	70.8	59.5	46.8	33.9	20.9	8.2
222	8.0	20.8	33.7	46.7	59.3	70.5	76.2	70.5	59.3	46.7	33.7	20.8	8.0
223	7.9	20.7	33.6	46.6	59.1	70.3	75.9	70.3	59.1	46.6	33.6	20.7	7.9
224	7.7	20.5	33.5	46.4	59.0	70.1	75.6	70.1	59.0	46.4	33.5	20.5	7.7
225	7.6	20.4	33.4	46.3	58.8	69.9	75.3	69.9	58.8	46.3	33.4	20.4	7.6
226	7.4	20.2	33.2	46.1	58.6	69.6	75.0	69.6	58.6	46.1	33.2	20.2	7.4
227	7.3	20.1	33.1	46.0	58.5	69.4	74.7	69.4	58.5	46.0	33.1	20.1	7.3
228	7.1	20.0	32.9	45.8	58.3	69.1	74.4	69.1	58.3	45.8	32.9	20.0	7.1
229	7.0	19.8	32.8	45.7	58.1	68.9	74.1	68.9	58.1	45.7	32.8	19.8	7.0
230	6.8	19.7	32.6	45.5	57.9	68.6	73.7	68.6	57.9	45.5	32.6	19.7	6.8
231	6.6	19.5	32.5	45.4	57.7	68.4	73.4	68.4	57.7	45.4	32.5	19.5	6.6
232	6.5	19.3	32.3	45.2	57.5	68.1	73.0	68.1	57.5	45.2	32.3	19.3	6.5
233	6.3	19.2	32.2	45.0	57.3	67.8	72.7	67.8	57.3	45.0	32.2	19.2	6.3
234	6.1	19.0	32.0	44.8	57.1	67.5	72.4	67.5	57.1	44.8	32.0	19.0	6.1
235	6.0	18.9	31.8	44.7	56.9	67.2	72.0	67.2	56.9	44.7	31.8	18.9	6.0
236	5.8	18.7	31.7	44.5	56.7	67.0	71.6	67.0	56.7	44.5	31.7	18.7	5.8
237	5.6	18.5	31.5	44.3	56.4	66.7	71.3	66.7	56.4	44.3	31.5	18.5	5.6
238	5.4	18.3	31.3	44.1	56.2	66.4	70.9	66.4	56.2	44.1	31.3	18.3	5.4
239	5.2	18.2	31.1	43.9	56.0	66.0	70.5	66.0	56.0	43.9	31.1	18.2	5.2
240	5.1	18.0	31.0	43.7	55.7	65.7	70.2	65.7	55.7	43.7	31.0	18.0	5.1
241	4.9	17.8	30.8	43.5	55.5	65.4	69.8	65.4	55.5	43.5	30.8	17.8	4.9
242	4.7	17.6	30.6	43.3	55.2	65.1	69.4	65.1	55.2	43.3	30.6	17.6	4.7
243	4.5	17.4	30.4	43.1	55.0	64.8	69.0	64.8	55.0	43.1	30.4	17.4	4.5
244	4.3	17.3	30.2	42.9	54.7	64.4	68.6	64.4	54.7	42.9	30.2	17.3	4.3

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 214 TO 244

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
214	11.7	23.0	34.5	45.8	56.3	64.8	68.4	64.8	56.3	45.8	34.5	23.0	11.7
215	11.5	22.9	34.3	45.6	56.2	64.6	68.1	64.6	56.2	45.6	34.3	22.9	11.5
216	11.4	22.7	34.2	45.5	56.0	64.4	67.9	64.4	56.0	45.5	34.2	22.7	11.4
217	11.2	22.6	34.0	45.3	55.8	64.1	67.6	64.1	55.8	45.3	34.0	22.6	11.2
218	11.1	22.4	33.9	45.1	55.6	63.9	67.4	63.9	55.6	45.1	33.9	22.4	11.1
219	10.9	22.2	33.7	45.0	55.4	63.7	67.1	63.7	55.4	45.0	33.7	22.2	10.9
220	10.7	22.1	33.5	44.8	55.2	63.4	66.8	63.4	55.2	44.8	33.5	22.1	10.7
221	10.5	21.9	33.4	44.6	55.0	63.1	66.5	63.1	55.0	44.6	33.4	21.9	10.5
222	10.3	21.7	33.2	44.4	54.7	62.9	66.2	62.9	54.7	44.4	33.2	21.7	10.3
223	10.2	21.5	33.0	44.2	54.5	62.6	65.9	62.6	54.5	44.2	33.0	21.5	10.2
224	10.0	21.4	32.8	44.0	54.3	62.3	65.6	62.3	54.3	44.0	32.8	21.4	10.0
225	9.8	21.2	32.6	43.8	54.1	62.1	65.3	62.1	54.1	43.8	32.6	21.2	9.8
226	9.6	21.0	32.4	43.6	53.8	61.8	65.0	61.8	53.8	43.6	32.4	21.0	9.6
227	9.4	20.8	32.3	43.4	53.6	61.5	64.7	61.5	53.6	43.4	32.3	20.8	9.4
228	9.2	20.6	32.1	43.2	53.3	61.2	64.4	61.2	53.3	43.2	32.1	20.6	9.2
229	9.0	20.4	31.8	43.0	53.1	60.9	64.1	60.9	53.1	43.0	31.8	20.4	9.0
230	8.8	20.2	31.6	42.7	52.8	60.6	63.7	60.6	52.8	42.7	31.6	20.2	8.8
231	8.6	20.0	31.4	42.5	52.6	60.3	63.4	60.3	52.6	42.5	31.4	20.0	8.6
232	8.3	19.8	31.2	42.3	52.3	60.0	63.0	60.0	52.3	42.3	31.2	19.8	8.3
233	8.1	19.6	31.0	42.0	52.0	59.7	62.7	59.7	52.0	42.0	31.0	19.6	8.1
234	7.9	19.3	30.8	41.8	51.8	59.4	62.4	59.4	51.8	41.8	30.8	19.3	7.9
235	7.7	19.1	30.5	41.6	51.5	59.0	62.0	59.0	51.5	41.6	30.5	19.1	7.7
236	7.5	18.9	30.3	41.3	51.2	58.7	61.6	58.7	51.2	41.3	30.3	18.9	7.5
237	7.2	18.7	30.1	41.1	50.9	58.4	61.3	58.4	50.9	41.1	30.1	18.7	7.2
238	7.0	18.4	29.9	40.8	50.6	58.0	60.9	58.0	50.6	40.8	29.9	18.4	7.0
239	6.7	18.2	29.6	40.5	50.3	57.7	60.5	57.7	50.3	40.5	29.6	18.2	6.7
240	6.5	18.0	29.4	40.3	50.0	57.3	60.2	57.3	50.0	40.3	29.4	18.0	6.5
241	6.3	17.7	29.1	40.0	49.7	57.0	59.8	57.0	49.7	40.0	29.1	17.7	6.3
242	6.0	17.5	28.9	39.7	49.4	56.6	59.4	56.6	49.4	39.7	28.9	17.5	6.0
243	5.8	17.2	28.6	39.5	49.1	56.3	59.0	56.3	49.1	39.5	28.6	17.2	5.8
244	5.5	17.0	28.4	39.2	48.8	55.9	58.6	55.9	48.8	39.2	28.4	17.0	5.5

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 214 TO 244

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
214	14.0	23.5	33.1	42.3	50.3	56.2	58.4	56.2	50.3	42.3	33.1	23.5	14.0
215	13.8	23.4	33.0	42.1	50.1	55.9	58.1	55.9	50.1	42.1	33.0	23.4	13.8
216	13.6	23.2	32.8	41.9	49.9	55.7	57.9	55.7	49.9	41.9	32.8	23.2	13.6
217	13.4	23.0	32.6	41.7	49.7	55.5	57.6	55.5	49.7	41.7	32.6	23.0	13.4
218	13.2	22.8	32.4	41.5	49.4	55.2	57.4	55.2	49.4	41.5	32.4	22.8	13.2
219	13.0	22.6	32.2	41.3	49.2	54.9	57.1	54.9	49.2	41.3	32.2	22.6	13.0
220	12.8	22.4	31.9	41.0	49.0	54.7	56.8	54.7	49.0	41.0	31.9	22.4	12.8
221	12.6	22.2	31.7	40.8	48.7	54.4	56.5	54.4	48.7	40.8	31.7	22.2	12.6
222	12.4	22.0	31.5	40.6	48.5	54.1	56.2	54.1	48.5	40.6	31.5	22.0	12.4
223	12.1	21.7	31.3	40.3	48.2	53.8	55.9	53.8	48.2	40.3	31.3	21.7	12.1
224	11.9	21.5	31.1	40.1	47.9	53.5	55.6	53.5	47.9	40.1	31.1	21.5	11.9
225	11.7	21.3	30.8	39.9	47.7	53.3	55.3	53.3	47.7	39.9	30.8	21.3	11.7
226	11.4	21.0	30.6	39.6	47.4	53.0	55.0	53.0	47.4	39.6	30.6	21.0	11.4
227	11.2	20.8	30.4	39.3	47.1	52.7	54.7	52.7	47.1	39.3	30.4	20.8	11.2
228	11.0	20.6	30.1	39.1	46.8	52.3	54.4	52.3	46.8	39.1	30.1	20.6	11.0
229	10.7	20.3	29.9	38.8	46.6	52.0	54.1	52.0	46.6	38.8	29.9	20.3	10.7
230	10.5	20.1	29.6	38.6	46.3	51.7	53.7	51.7	46.3	38.6	29.6	20.1	10.5
231	10.2	19.8	29.3	38.3	46.0	51.4	53.4	51.4	46.0	38.3	29.3	19.8	10.2
232	10.0	19.6	29.1	38.0	45.7	51.1	53.0	51.1	45.7	38.0	29.1	19.6	10.0
233	9.7	19.3	28.8	37.7	45.4	50.7	52.7	50.7	45.4	37.7	28.8	19.3	9.7
234	9.4	19.0	28.5	37.4	45.0	50.4	52.4	50.4	45.0	37.4	28.5	19.0	9.4
235	9.2	18.8	28.3	37.1	44.7	50.0	52.0	50.0	44.7	37.1	28.3	18.8	9.2
236	8.9	18.5	28.0	36.8	44.4	49.7	51.6	49.7	44.4	36.8	28.0	18.5	8.9
237	8.6	18.2	27.7	36.5	44.1	49.3	51.3	49.3	44.1	36.5	27.7	18.2	8.6
238	8.3	18.0	27.4	36.2	43.8	49.0	50.9	49.0	43.8	36.2	27.4	18.0	8.3
239	8.1	17.7	27.1	35.9	43.4	48.6	50.5	48.6	43.4	35.9	27.1	17.7	8.1
240	7.8	17.4	26.8	35.6	43.1	48.3	50.2	48.3	43.1	35.6	26.8	17.4	7.8
241	7.5	17.1	26.5	35.3	42.7	47.9	49.8	47.9	42.7	35.3	26.5	17.1	7.5
242	7.2	16.8	26.2	35.0	42.4	47.5	49.4	47.5	42.4	35.0	26.2	16.8	7.2
243	6.9	16.5	25.9	34.7	42.1	47.2	49.0	47.2	42.1	34.7	25.9	16.5	6.9
244	6.6	16.2	25.6	34.3	41.7	46.8	48.6	46.8	41.7	34.3	25.6	16.2	6.6

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 214 TO 244

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
214	15.9	23.3	30.7	37.5	43.2	47.0	48.4	47.0	43.2	37.5	30.7	23.3	15.9
215	15.6	23.1	30.5	37.3	42.9	46.8	48.1	46.8	42.9	37.3	30.5	23.1	15.6
216	15.4	22.9	30.3	37.0	42.7	46.5	47.9	46.5	42.7	37.0	30.3	22.9	15.4
217	15.2	22.7	30.0	36.8	42.4	46.3	47.6	46.3	42.4	36.8	30.0	22.7	15.2
218	15.0	22.4	29.8	36.6	42.2	46.0	47.4	46.0	42.2	36.6	29.8	22.4	15.0
219	14.7	22.2	29.6	36.3	41.9	45.7	47.1	45.7	41.9	36.3	29.6	22.2	14.7
220	14.5	22.0	29.3	36.1	41.7	45.5	46.8	45.5	41.7	36.1	29.3	22.0	14.5
221	14.3	21.7	29.1	35.8	41.4	45.2	46.5	45.2	41.4	35.8	29.1	21.7	14.3
222	14.0	21.5	28.8	35.6	41.1	44.9	46.2	44.9	41.1	35.6	28.8	21.5	14.0
223	13.8	21.2	28.6	35.3	40.9	44.6	45.9	44.6	40.9	35.3	28.6	21.2	13.8
224	13.5	21.0	28.3	35.0	40.6	44.3	45.6	44.3	40.6	35.0	28.3	21.0	13.5
225	13.2	20.7	28.0	34.7	40.3	44.0	45.3	44.0	40.3	34.7	28.0	20.7	13.2
226	13.0	20.5	27.8	34.5	40.0	43.7	45.0	43.7	40.0	34.5	27.8	20.5	13.0
227	12.7	20.2	27.5	34.2	39.7	43.4	44.7	43.4	39.7	34.2	27.5	20.2	12.7
228	12.4	19.9	27.2	33.9	39.4	43.1	44.4	43.1	39.4	33.9	27.2	19.9	12.4
229	12.1	19.6	26.9	33.6	39.1	42.8	44.1	42.8	39.1	33.6	26.9	19.6	12.1
230	11.9	19.3	26.6	33.3	38.8	42.4	43.7	42.4	38.8	33.3	26.6	19.3	11.9
231	11.6	19.1	26.3	33.0	38.4	42.1	43.4	42.1	38.4	33.0	26.3	19.1	11.6
232	11.3	18.8	26.0	32.7	38.1	41.8	43.0	41.8	38.1	32.7	26.0	18.8	11.3
233	11.0	18.5	25.7	32.4	37.8	41.4	42.7	41.4	37.8	32.4	25.7	18.5	11.0
234	10.7	18.2	25.4	32.0	37.5	41.1	42.4	41.1	37.5	32.0	25.4	18.2	10.7
235	10.4	17.9	25.1	31.7	37.1	40.7	42.0	40.7	37.1	31.7	25.1	17.9	10.4
236	10.1	17.5	24.8	31.4	36.8	40.4	41.6	40.4	36.8	31.4	24.8	17.5	10.1
237	9.7	17.2	24.5	31.1	36.4	40.0	41.3	40.0	36.4	31.1	24.5	17.2	9.7
238	9.4	16.9	24.2	30.7	36.1	39.7	40.9	39.7	36.1	30.7	24.2	16.9	9.4
239	9.1	16.6	23.8	30.4	35.7	39.3	40.5	39.3	35.7	30.4	23.8	16.6	9.1
240	8.8	16.3	23.5	30.1	35.4	38.9	40.2	38.9	35.4	30.1	23.5	16.3	8.8
241	8.5	15.9	23.2	29.7	35.0	38.5	39.8	38.5	35.0	29.7	23.2	15.9	8.5
242	8.1	15.6	22.8	29.4	34.7	38.2	39.4	38.2	34.7	29.4	22.8	15.6	8.1
243	7.8	15.3	22.5	29.0	34.3	37.8	39.0	37.8	34.3	29.0	22.5	15.3	7.8
244	7.5	14.9	22.1	28.6	33.9	37.4	38.6	37.4	33.9	28.6	22.1	14.9	7.5

APPENDIX I

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 245 TO 274

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 245 TO 274

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
245	2.8	16.8	30.9	45.0	58.7	71.3	78.2	71.3	58.7	45.0	30.9	16.8	2.8
246	2.7	16.7	30.8	44.8	58.5	71.1	77.8	71.1	58.5	44.8	30.8	16.7	2.7
247	2.5	16.6	30.7	44.7	58.3	70.8	77.4	70.8	58.3	44.7	30.7	16.6	2.5
248	2.4	16.5	30.5	44.5	58.2	70.5	77.0	70.5	58.2	44.5	30.5	16.5	2.4
249	2.3	16.3	30.4	44.4	58.0	70.2	76.6	70.2	58.0	44.4	30.4	16.3	2.3
250	2.1	16.2	30.3	44.2	57.8	69.9	76.2	69.9	57.8	44.2	30.3	16.2	2.1
251	2.0	16.1	30.1	44.1	57.6	69.7	75.8	69.7	57.6	44.1	30.1	16.1	2.0
252	1.8	15.9	30.0	43.9	57.4	69.4	75.4	69.4	57.4	43.9	30.0	15.9	1.8
253	1.7	15.8	29.9	43.8	57.2	69.1	75.0	69.1	57.2	43.8	29.9	15.8	1.7
254	1.6	15.6	29.7	43.6	57.0	68.7	74.6	68.7	57.0	43.6	29.7	15.6	1.6
255	1.4	15.5	29.6	43.4	56.8	68.4	74.1	68.4	56.8	43.4	29.6	15.5	1.4
256	1.3	15.4	29.4	43.3	56.5	68.1	73.7	68.1	56.5	43.3	29.4	15.4	1.3
257	1.1	15.2	29.3	43.1	56.3	67.8	73.3	67.8	56.3	43.1	29.3	15.2	1.1
258	1.0	15.1	29.1	42.9	56.1	67.5	72.9	67.5	56.1	42.9	29.1	15.1	1.0
259	0.8	14.9	29.0	42.7	55.9	67.1	72.5	67.1	55.9	42.7	29.0	14.9	0.8
260	0.7	14.8	28.8	42.5	55.6	66.8	72.0	66.8	55.6	42.5	28.8	14.8	0.7
261	0.5	14.6	28.6	42.4	55.4	66.5	71.6	66.5	55.4	42.4	28.6	14.6	0.5
262	0.4	14.5	28.5	42.2	55.1	66.1	71.2	66.1	55.1	42.2	28.5	14.5	0.4
263	0.3	14.3	28.3	42.0	54.9	65.8	70.7	65.8	54.9	42.0	28.3	14.3	0.3
264	0.1	14.2	28.1	41.8	54.7	65.4	70.3	65.4	54.7	41.8	28.1	14.2	0.1
265	0.0	14.0	28.0	41.6	54.4	65.1	69.9	65.1	54.4	41.6	28.0	14.0	0.0
266	-0.2	13.9	27.8	41.4	54.2	64.7	69.5	64.7	54.2	41.4	27.8	13.9	-0.2
267	-0.3	13.7	27.6	41.2	53.9	64.4	69.0	64.4	53.9	41.2	27.6	13.7	-0.3
268	-0.5	13.6	27.5	41.0	53.6	64.0	68.6	64.0	53.6	41.0	27.5	13.6	-0.5
269	-0.6	13.4	27.3	40.8	53.4	63.7	68.2	63.7	53.4	40.8	27.3	13.4	-0.6
270	-0.8	13.3	27.1	40.6	53.1	63.3	67.8	63.3	53.1	40.6	27.1	13.3	-0.8
271	-0.9	13.1	27.0	40.4	52.8	63.0	67.3	63.0	52.8	40.4	27.0	13.1	-0.9
272	-1.1	13.0	26.8	40.2	52.6	62.6	66.9	62.6	52.6	40.2	26.8	13.0	-1.1
273	-1.2	12.8	26.6	40.0	52.3	62.3	66.5	62.3	52.3	40.0	26.6	12.8	-1.2
274	-1.3	12.7	26.4	39.7	52.0	61.9	66.1	61.9	52.0	39.7	26.4	12.7	-1.3

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 245 TO 274

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
245	4.1	17.1	30.0	42.7	54.5	64.1	68.2	64.1	54.5	42.7	30.0	17.1	4.1
246	3.9	16.9	29.8	42.4	54.2	63.7	67.8	63.7	54.2	42.4	29.8	16.9	3.9
247	3.7	16.7	29.6	42.2	53.9	63.4	67.4	63.4	53.9	42.2	29.6	16.7	3.7
248	3.5	16.5	29.4	42.0	53.7	63.1	67.0	63.1	53.7	42.0	29.4	16.5	3.5
249	3.3	16.3	29.2	41.8	53.4	62.7	66.6	62.7	53.4	41.8	29.2	16.3	3.3
250	3.1	16.1	29.0	41.5	53.1	62.3	66.2	62.3	53.1	41.5	29.0	16.1	3.1
251	2.9	15.9	28.8	41.3	52.8	62.0	65.8	62.0	52.8	41.3	28.8	15.9	2.9
252	2.7	15.7	28.6	41.0	52.5	61.6	65.4	61.6	52.5	41.0	28.6	15.7	2.7
253	2.5	15.5	28.3	40.8	52.2	61.3	65.0	61.3	52.2	40.8	28.3	15.5	2.5
254	2.3	15.3	28.1	40.6	51.9	60.9	64.6	60.9	51.9	40.6	28.1	15.3	2.3
255	2.1	15.1	27.9	40.3	51.6	60.5	64.1	60.5	51.6	40.3	27.9	15.1	2.1
256	1.9	14.8	27.7	40.1	51.3	60.1	63.7	60.1	51.3	40.1	27.7	14.8	1.9
257	1.6	14.6	27.5	39.8	51.0	59.8	63.3	59.8	51.0	39.8	27.5	14.6	1.6
258	1.4	14.4	27.2	39.5	50.7	59.4	62.9	59.4	50.7	39.5	27.2	14.4	1.4
259	1.2	14.2	27.0	39.3	50.4	59.0	62.5	59.0	50.4	39.3	27.0	14.2	1.2
260	1.0	14.0	26.8	39.0	50.1	58.6	62.0	58.6	50.1	39.0	26.8	14.0	1.0
261	0.8	13.8	26.5	38.8	49.8	58.2	61.6	58.2	49.8	38.8	26.5	13.8	0.8
262	0.6	13.6	26.3	38.5	49.5	57.8	61.2	57.8	49.5	38.5	26.3	13.6	0.6
263	0.4	13.3	26.1	38.2	49.2	57.5	60.7	57.5	49.2	38.2	26.1	13.3	0.4
264	0.2	13.1	25.8	38.0	48.8	57.1	60.3	57.1	48.8	38.0	25.8	13.1	0.2
265	-0.1	12.9	25.6	37.7	48.5	56.7	59.9	56.7	48.5	37.7	25.6	12.9	-0.1
266	-0.3	12.7	25.4	37.4	48.2	56.3	59.5	56.3	48.2	37.4	25.4	12.7	-0.3
267	-0.5	12.5	25.1	37.1	47.9	55.9	59.0	55.9	47.9	37.1	25.1	12.5	-0.5
268	-0.7	12.2	24.9	36.9	47.5	55.5	58.6	55.5	47.5	36.9	24.9	12.2	-0.7
269	-0.9	12.0	24.6	36.6	47.2	55.1	58.2	55.1	47.2	36.6	24.6	12.0	-0.9
270	-1.1	11.8	24.4	36.3	46.9	54.7	57.8	54.7	46.9	36.3	24.4	11.8	-1.1
271	-1.3	11.6	24.2	36.0	46.5	54.3	57.3	54.3	46.5	36.0	24.2	11.6	-1.3
272	-1.5	11.4	23.9	35.8	46.2	53.9	56.9	53.9	46.2	35.8	23.9	11.4	-1.5
273	-1.8	11.1	23.7	35.5	45.9	53.5	56.5	53.5	45.9	35.5	23.7	11.1	-1.8
274	-2.0	10.9	23.4	35.2	45.6	53.2	56.1	53.2	45.6	35.2	23.4	10.9	-2.0

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 245 TO 274

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
245	5.3	16.8	28.1	38.9	48.5	55.5	58.2	55.5	48.5	38.9	28.1	16.8	5.3
246	5.0	16.5	27.8	38.6	48.1	55.1	57.8	55.1	48.1	38.6	27.8	16.5	5.0
247	4.8	16.2	27.6	38.3	47.8	54.8	57.4	54.8	47.8	38.3	27.6	16.2	4.8
248	4.5	16.0	27.3	38.0	47.5	54.4	57.0	54.4	47.5	38.0	27.3	16.0	4.5
249	4.3	15.7	27.0	37.7	47.2	54.0	56.6	54.0	47.2	37.7	27.0	15.7	4.3
250	4.0	15.5	26.8	37.5	46.8	53.6	56.2	53.6	46.8	37.5	26.8	15.5	4.0
251	3.7	15.2	26.5	37.2	46.5	53.2	55.8	53.2	46.5	37.2	26.5	15.2	3.7
252	3.5	14.9	26.2	36.8	46.1	52.9	55.4	52.9	46.1	36.8	26.2	14.9	3.5
253	3.2	14.7	25.9	36.5	45.8	52.5	55.0	52.5	45.8	36.5	25.9	14.7	3.2
254	2.9	14.4	25.7	36.2	45.4	52.1	54.6	52.1	45.4	36.2	25.7	14.4	2.9
255	2.7	14.1	25.4	35.9	45.1	51.7	54.1	51.7	45.1	35.9	25.4	14.1	2.7
256	2.4	13.9	25.1	35.6	44.7	51.3	53.7	51.3	44.7	35.6	25.1	13.9	2.4
257	2.1	13.6	24.8	35.3	44.4	50.9	53.3	50.9	44.4	35.3	24.8	13.6	2.1
258	1.8	13.3	24.5	35.0	44.0	50.5	52.9	50.5	44.0	35.0	24.5	13.3	1.8
259	1.6	13.0	24.2	34.7	43.7	50.1	52.5	50.1	43.7	34.7	24.2	13.0	1.6
260	1.3	12.8	23.9	34.3	43.3	49.7	52.0	49.7	43.3	34.3	23.9	12.8	1.3
261	1.0	12.5	23.6	34.0	42.9	49.3	51.6	49.3	42.9	34.0	23.6	12.5	1.0
262	0.8	12.2	23.3	33.7	42.6	48.8	51.2	48.8	42.6	33.7	23.3	12.2	0.8
263	0.5	11.9	23.0	33.4	42.2	48.4	50.7	48.4	42.2	33.4	23.0	11.9	0.5
264	0.2	11.6	22.7	33.0	41.8	48.0	50.3	48.0	41.8	33.0	22.7	11.6	0.2
265	-0.1	11.4	22.4	32.7	41.5	47.6	49.9	47.6	41.5	32.7	22.4	11.4	-0.1
266	-0.3	11.1	22.1	32.4	41.1	47.2	49.5	47.2	41.1	32.4	22.1	11.1	-0.3
267	-0.6	10.8	21.8	32.1	40.7	46.8	49.0	46.8	40.7	32.1	21.8	10.8	-0.6
268	-0.9	10.5	21.6	31.7	40.4	46.4	48.6	46.4	40.4	31.7	21.6	10.5	-0.9
269	-1.2	10.2	21.3	31.4	40.0	46.0	48.2	46.0	40.0	31.4	21.3	10.2	-1.2
270	-1.4	10.0	21.0	31.1	39.6	45.6	47.8	45.6	39.6	31.1	21.0	10.0	-1.4
271	-1.7	9.7	20.7	30.7	39.3	45.2	47.3	45.2	39.3	30.7	20.7	9.7	-1.7
272	-2.0	9.4	20.4	30.4	38.9	44.8	46.9	44.8	38.9	30.4	20.4	9.4	-2.0
273	-2.3	9.1	20.1	30.1	38.5	44.4	46.5	44.4	38.5	30.1	20.1	9.1	-2.3
274	-2.5	8.8	19.8	29.8	38.2	44.0	46.1	44.0	38.2	29.8	19.8	8.8	-2.5

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 245 TO 274

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
245	6.3	15.9	25.3	34.0	41.3	46.4	48.2	46.4	41.3	34.0	25.3	15.9	6.3
246	6.0	15.6	25.0	33.7	41.0	46.0	47.8	46.0	41.0	33.7	25.0	15.6	6.0
247	5.7	15.3	24.7	33.4	40.6	45.6	47.4	45.6	40.6	33.4	24.7	15.3	5.7
248	5.4	15.0	24.4	33.0	40.3	45.2	47.0	45.2	40.3	33.0	24.4	15.0	5.4
249	5.1	14.7	24.1	32.7	39.9	44.8	46.6	44.8	39.9	32.7	24.1	14.7	5.1
250	4.8	14.4	23.7	32.3	39.5	44.4	46.2	44.4	39.5	32.3	23.7	14.4	4.8
251	4.4	14.1	23.4	32.0	39.1	44.0	45.8	44.0	39.1	32.0	23.4	14.1	4.4
252	4.1	13.7	23.1	31.6	38.8	43.6	45.4	43.6	38.8	31.6	23.1	13.7	4.1
253	3.8	13.4	22.7	31.3	38.4	43.2	45.0	43.2	38.4	31.3	22.7	13.4	3.8
254	3.5	13.1	22.4	30.9	38.0	42.8	44.6	42.8	38.0	30.9	22.4	13.1	3.5
255	3.2	12.8	22.1	30.6	37.6	42.4	44.1	42.4	37.6	30.6	22.1	12.8	3.2
256	2.9	12.5	21.7	30.2	37.2	42.0	43.7	42.0	37.2	30.2	21.7	12.5	2.9
257	2.5	12.1	21.4	29.9	36.9	41.6	43.3	41.6	36.9	29.9	21.4	12.1	2.5
258	2.2	11.8	21.1	29.5	36.5	41.2	42.9	41.2	36.5	29.5	21.1	11.8	2.2
259	1.9	11.5	20.7	29.1	36.1	40.8	42.5	40.8	36.1	29.1	20.7	11.5	1.9
260	1.6	11.1	20.4	28.8	35.7	40.4	42.0	40.4	35.7	28.8	20.4	11.1	1.6
261	1.2	10.8	20.0	28.4	35.3	39.9	41.6	39.9	35.3	28.4	20.0	10.8	1.2
262	0.9	10.5	19.7	28.0	34.9	39.5	41.2	39.5	34.9	28.0	19.7	10.5	0.9
263	0.6	10.2	19.4	27.7	34.5	39.1	40.7	39.1	34.5	27.7	19.4	10.2	0.6
264	0.2	9.8	19.0	27.3	34.1	38.7	40.3	38.7	34.1	27.3	19.0	9.8	0.2
265	-0.1	9.5	18.7	26.9	33.7	38.3	39.9	38.3	33.7	26.9	18.7	9.5	-0.1
266	-0.4	9.2	18.3	26.6	33.3	37.9	39.5	37.9	33.3	26.6	18.3	9.2	-0.4
267	-0.7	8.8	18.0	26.2	32.9	37.4	39.0	37.4	32.9	26.2	18.0	8.8	-0.7
268	-1.1	8.5	17.6	25.8	32.5	37.0	38.6	37.0	32.5	25.8	17.6	8.5	-1.1
269	-1.4	8.2	17.3	25.5	32.1	36.6	38.2	36.6	32.1	25.5	17.3	8.2	-1.4
270	-1.7	7.8	16.9	25.1	31.8	36.2	37.8	36.2	31.8	25.1	16.9	7.8	-1.7
271	-2.0	7.5	16.6	24.7	31.4	35.8	37.3	35.8	31.4	24.7	16.6	7.5	-2.0
272	-2.4	7.2	16.2	24.4	31.0	35.4	36.9	35.4	31.0	24.4	16.2	7.2	-2.4
273	-2.7	6.8	15.9	24.0	30.6	34.9	36.5	34.9	30.6	24.0	15.9	6.8	-2.7
274	-3.0	6.5	15.6	23.6	30.2	34.5	36.1	34.5	30.2	23.6	15.6	6.5	-3.0

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 245 TO 274

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
245	7.1	14.6	21.8	28.3	33.5	37.0	38.2	37.0	33.5	28.3	21.8	14.6	7.1
246	6.8	14.3	21.4	27.9	33.2	36.6	37.8	36.6	33.2	27.9	21.4	14.3	6.8
247	6.4	13.9	21.1	27.6	32.8	36.2	37.4	36.2	32.8	27.6	21.1	13.9	6.4
248	6.1	13.6	20.7	27.2	32.4	35.8	37.0	35.8	32.4	27.2	20.7	13.6	6.1
249	5.7	13.2	20.4	26.8	32.0	35.4	36.6	35.4	32.0	26.8	20.4	13.2	5.7
250	5.4	12.9	20.0	26.4	31.6	35.0	36.2	35.0	31.6	26.4	20.0	12.9	5.4
251	5.0	12.5	19.7	26.1	31.2	34.6	35.8	34.6	31.2	26.1	19.7	12.5	5.0
252	4.7	12.1	19.3	25.7	30.8	34.2	35.4	34.2	30.8	25.7	19.3	12.1	4.7
253	4.3	11.8	18.9	25.3	30.4	33.8	35.0	33.8	30.4	25.3	18.9	11.8	4.3
254	3.9	11.4	18.5	24.9	30.0	33.4	34.6	33.4	30.0	24.9	18.5	11.4	3.9
255	3.6	11.0	18.2	24.5	29.6	33.0	34.1	33.0	29.6	24.5	18.2	11.0	3.6
256	3.2	10.7	17.8	24.1	29.2	32.6	33.7	32.6	29.2	24.1	17.8	10.7	3.2
257	2.9	10.3	17.4	23.8	28.8	32.1	33.3	32.1	28.8	23.8	17.4	10.3	2.9
258	2.5	9.9	17.0	23.4	28.4	31.7	32.9	31.7	28.4	23.4	17.0	9.9	2.5
259	2.1	9.6	16.7	23.0	28.0	31.3	32.5	31.3	28.0	23.0	16.7	9.6	2.1
260	1.8	9.2	16.3	22.6	27.6	30.9	32.0	30.9	27.6	22.6	16.3	9.2	1.8
261	1.4	8.8	15.9	22.2	27.2	30.5	31.6	30.5	27.2	22.2	15.9	8.8	1.4
262	1.0	8.5	15.5	21.8	26.8	30.0	31.2	30.0	26.8	21.8	15.5	8.5	1.0
263	0.6	8.1	15.1	21.4	26.4	29.6	30.7	29.6	26.4	21.4	15.1	8.1	0.6
264	0.3	7.7	14.8	21.0	26.0	29.2	30.3	29.2	26.0	21.0	14.8	7.7	0.3
265	-0.1	7.3	14.4	20.6	25.6	28.8	29.9	28.8	25.6	20.6	14.4	7.3	-0.1
266	-0.5	7.0	14.0	20.2	25.1	28.4	29.5	28.4	25.1	20.2	14.0	7.0	-0.5
267	-0.8	6.6	13.6	19.8	24.7	27.9	29.0	27.9	24.7	19.8	13.6	6.6	-0.8
268	-1.2	6.2	13.2	19.4	24.3	27.5	28.6	27.5	24.3	19.4	13.2	6.2	-1.2
269	-1.6	5.8	12.9	19.0	23.9	27.1	28.2	27.1	23.9	19.0	12.9	5.8	-1.6
270	-1.9	5.5	12.5	18.6	23.5	26.7	27.8	26.7	23.5	18.6	12.5	5.5	-1.9
271	-2.3	5.1	12.1	18.2	23.1	26.2	27.3	26.2	23.1	18.2	12.1	5.1	-2.3
272	-2.7	4.7	11.7	17.8	22.7	25.8	26.9	25.8	22.7	17.8	11.7	4.7	-2.7
273	-3.0	4.4	11.3	17.4	22.3	25.4	26.5	25.4	22.3	17.4	11.3	4.4	-3.0
274	-3.4	4.0	11.0	17.1	21.9	25.0	26.1	25.0	21.9	17.1	11.0	4.0	-3.4

APPENDIX J

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 275 TO 305

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 275 TO 305

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
275	-1.5	12.5	26.3	39.5	51.8	61.5	65.6	61.5	51.8	39.5	26.3	12.5	-1.5
276	-1.6	12.4	26.1	39.3	51.5	61.2	65.2	61.2	51.5	39.3	26.1	12.4	-1.6
277	-1.8	12.2	25.9	39.1	51.2	60.8	64.8	60.8	51.2	39.1	25.9	12.2	-1.8
278	-1.9	12.0	25.7	38.9	50.9	60.5	64.4	60.5	50.9	38.9	25.7	12.0	-1.9
279	-2.1	11.9	25.6	38.7	50.7	60.1	64.0	60.1	50.7	38.7	25.6	11.9	-2.1
280	-2.2	11.7	25.4	38.5	50.4	59.7	63.6	59.7	50.4	38.5	25.4	11.7	-2.2
281	-2.3	11.6	25.2	38.2	50.1	59.4	63.2	59.4	50.1	38.2	25.2	11.6	-2.3
282	-2.5	11.4	25.0	38.0	49.8	59.0	62.8	59.0	49.8	38.0	25.0	11.4	-2.5
283	-2.6	11.3	24.9	37.8	49.6	58.7	62.4	58.7	49.6	37.8	24.9	11.3	-2.6
284	-2.7	11.1	24.7	37.6	49.3	58.3	62.0	58.3	49.3	37.6	24.7	11.1	-2.7
285	-2.9	11.0	24.5	37.4	49.0	58.0	61.6	58.0	49.0	37.4	24.5	11.0	-2.9
286	-3.0	10.8	24.3	37.2	48.7	57.6	61.2	57.6	48.7	37.2	24.3	10.8	-3.0
287	-3.1	10.7	24.1	37.0	48.5	57.3	60.8	57.3	48.5	37.0	24.1	10.7	-3.1
288	-3.3	10.5	24.0	36.7	48.2	56.9	60.4	56.9	48.2	36.7	24.0	10.5	-3.3
289	-3.4	10.4	23.8	36.5	47.9	56.6	60.0	56.6	47.9	36.5	23.8	10.4	-3.4
290	-3.5	10.2	23.6	36.3	47.7	56.2	59.7	56.2	47.7	36.3	23.6	10.2	-3.5
291	-3.6	10.1	23.5	36.1	47.4	55.9	59.3	55.9	47.4	36.1	23.5	10.1	-3.6
292	-3.8	10.0	23.3	35.9	47.1	55.6	58.9	55.6	47.1	35.9	23.3	10.0	-3.8
293	-3.9	9.8	23.1	35.7	46.9	55.3	58.5	55.3	46.9	35.7	23.1	9.8	-3.9
294	-4.0	9.7	22.9	35.5	46.6	54.9	58.2	54.9	46.6	35.5	22.9	9.7	-4.0
295	-4.1	9.5	22.8	35.3	46.3	54.6	57.8	54.6	46.3	35.3	22.8	9.5	-4.1
296	-4.3	9.4	22.6	35.1	46.1	54.3	57.5	54.3	46.1	35.1	22.6	9.4	-4.3
297	-4.4	9.3	22.4	34.9	45.8	54.0	57.1	54.0	45.8	34.9	22.4	9.3	-4.4
298	-4.5	9.1	22.3	34.7	45.6	53.7	56.8	53.7	45.6	34.7	22.3	9.1	-4.5
299	-4.6	9.0	22.1	34.5	45.3	53.3	56.4	53.3	45.3	34.5	22.1	9.0	-4.6
300	-4.7	8.9	22.0	34.3	45.1	53.0	56.1	53.0	45.1	34.3	22.0	8.9	-4.7
301	-4.8	8.7	21.8	34.1	44.8	52.7	55.8	52.7	44.8	34.1	21.8	8.7	-4.8
302	-4.9	8.6	21.6	33.9	44.6	52.4	55.5	52.4	44.6	33.9	21.6	8.6	-4.9
303	-5.0	8.5	21.5	33.7	44.3	52.1	55.1	52.1	44.3	33.7	21.5	8.5	-5.0
304	-5.1	8.3	21.3	33.5	44.1	51.9	54.8	51.9	44.1	33.5	21.3	8.3	-5.1
305	-5.2	8.2	21.2	33.3	43.9	51.6	54.5	51.6	43.9	33.3	21.2	8.2	-5.2

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 275 TO 305

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
275	-2.2	10.7	23.2	34.9	45.2	52.8	55.6	52.8	45.2	34.9	23.2	10.7	-2.2
276	-2.4	10.5	23.0	34.7	44.9	52.4	55.2	52.4	44.9	34.7	23.0	10.5	-2.4
277	-2.6	10.3	22.7	34.4	44.6	52.0	54.8	52.0	44.6	34.4	22.7	10.3	-2.6
278	-2.8	10.0	22.5	34.1	44.2	51.6	54.4	51.6	44.2	34.1	22.5	10.0	-2.8
279	-3.0	9.8	22.2	33.8	43.9	51.2	54.0	51.2	43.9	33.8	22.2	9.8	-3.0
280	-3.2	9.6	22.0	33.5	43.6	50.8	53.6	50.8	43.6	33.5	22.0	9.6	-3.2
281	-3.4	9.4	21.7	33.3	43.3	50.5	53.2	50.5	43.3	33.3	21.7	9.4	-3.4
282	-3.6	9.2	21.5	33.0	42.9	50.1	52.8	50.1	42.9	33.0	21.5	9.2	-3.6
283	-3.8	9.0	21.3	32.7	42.6	49.7	52.4	49.7	42.6	32.7	21.3	9.0	-3.8
284	-4.0	8.7	21.0	32.4	42.3	49.3	52.0	49.3	42.3	32.4	21.0	8.7	-4.0
285	-4.2	8.5	20.8	32.2	42.0	49.0	51.6	49.0	42.0	32.2	20.8	8.5	-4.2
286	-4.4	8.3	20.6	31.9	41.6	48.6	51.2	48.6	41.6	31.9	20.6	8.3	-4.4
287	-4.6	8.1	20.3	31.6	41.3	48.2	50.8	48.2	41.3	31.6	20.3	8.1	-4.6
288	-4.8	7.9	20.1	31.4	41.0	47.9	50.4	47.9	41.0	31.4	20.1	7.9	-4.8
289	-5.0	7.7	19.9	31.1	40.7	47.5	50.0	47.5	40.7	31.1	19.9	7.7	-5.0
290	-5.2	7.5	19.6	30.8	40.4	47.1	49.7	47.1	40.4	30.8	19.6	7.5	-5.2
291	-5.3	7.3	19.4	30.6	40.1	46.8	49.3	46.8	40.1	30.6	19.4	7.3	-5.3
292	-5.5	7.1	19.2	30.3	39.8	46.4	48.9	46.4	39.8	30.3	19.2	7.1	-5.5
293	-5.7	6.9	19.0	30.1	39.5	46.1	48.5	46.1	39.5	30.1	19.0	6.9	-5.7
294	-5.9	6.7	18.7	29.8	39.2	45.8	48.2	45.8	39.2	29.8	18.7	6.7	-5.9
295	-6.1	6.5	18.5	29.5	38.9	45.4	47.8	45.4	38.9	29.5	18.5	6.5	-6.1
296	-6.2	6.3	18.3	29.3	38.6	45.1	47.5	45.1	38.6	29.3	18.3	6.3	-6.2
297	-6.4	6.1	18.1	29.0	38.3	44.8	47.1	44.8	38.3	29.0	18.1	6.1	-6.4
298	-6.6	6.0	17.9	28.8	38.0	44.4	46.8	44.4	38.0	28.8	17.9	6.0	-6.6
299	-6.7	5.8	17.7	28.6	37.7	44.1	46.4	44.1	37.7	28.6	17.7	5.8	-6.7
300	-6.9	5.6	17.5	28.3	37.4	43.8	46.1	43.8	37.4	28.3	17.5	5.6	-6.9
301	-7.1	5.4	17.3	28.1	37.2	43.5	45.8	43.5	37.2	28.1	17.3	5.4	-7.1
302	-7.2	5.2	17.1	27.9	36.9	43.2	45.5	43.2	36.9	27.9	17.1	5.2	-7.2
303	-7.4	5.1	16.9	27.6	36.6	42.9	45.1	42.9	36.6	27.6	16.9	5.1	-7.4
304	-7.5	4.9	16.7	27.4	36.4	42.6	44.8	42.6	36.4	27.4	16.7	4.9	-7.5
305	-7.7	4.7	16.5	27.2	36.1	42.3	44.5	42.3	36.1	27.2	16.5	4.7	-7.7

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 275 TO 305

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
275	-2.8	8.6	19.5	29.4	37.8	43.6	45.6	43.6	37.8	29.4	19.5	8.6	-2.8
276	-3.1	8.3	19.2	29.1	37.4	43.2	45.2	43.2	37.4	29.1	19.2	8.3	-3.1
277	-3.3	8.0	18.9	28.8	37.1	42.8	44.8	42.8	37.1	28.8	18.9	8.0	-3.3
278	-3.6	7.7	18.6	28.4	36.7	42.4	44.4	42.4	36.7	28.4	18.6	7.7	-3.6
279	-3.9	7.5	18.3	28.1	36.3	42.0	44.0	42.0	36.3	28.1	18.3	7.5	-3.9
280	-4.1	7.2	18.0	27.8	36.0	41.6	43.6	41.6	36.0	27.8	18.0	7.2	-4.1
281	-4.4	6.9	17.7	27.5	35.6	41.2	43.2	41.2	35.6	27.5	17.7	6.9	-4.4
282	-4.6	6.6	17.4	27.2	35.3	40.8	42.8	40.8	35.3	27.2	17.4	6.6	-4.6
283	-4.9	6.4	17.1	26.8	34.9	40.4	42.4	40.4	34.9	26.8	17.1	6.4	-4.9
284	-5.2	6.1	16.8	26.5	34.5	40.0	42.0	40.0	34.5	26.5	16.8	6.1	-5.2
285	-5.4	5.9	16.5	26.2	34.2	39.6	41.6	39.6	34.2	26.2	16.5	5.9	-5.4
286	-5.7	5.6	16.3	25.9	33.9	39.2	41.2	39.2	33.9	25.9	16.3	5.6	-5.7
287	-5.9	5.3	16.0	25.6	33.5	38.9	40.8	38.9	33.5	25.6	16.0	5.3	-5.9
288	-6.1	5.1	15.7	25.3	33.2	38.5	40.4	38.5	33.2	25.3	15.7	5.1	-6.1
289	-6.4	4.8	15.4	25.0	32.8	38.1	40.0	38.1	32.8	25.0	15.4	4.8	-6.4
290	-6.6	4.6	15.1	24.7	32.5	37.8	39.7	37.8	32.5	24.7	15.1	4.6	-6.6
291	-6.9	4.3	14.9	24.4	32.2	37.4	39.3	37.4	32.2	24.4	14.9	4.3	-6.9
292	-7.1	4.1	14.6	24.1	31.8	37.0	38.9	37.0	31.8	24.1	14.6	4.1	-7.1
293	-7.3	3.8	14.3	23.8	31.5	36.7	38.5	36.7	31.5	23.8	14.3	3.8	-7.3
294	-7.6	3.6	14.1	23.5	31.2	36.3	38.2	36.3	31.2	23.5	14.1	3.6	-7.6
295	-7.8	3.3	13.8	23.2	30.9	36.0	37.8	36.0	30.9	23.2	13.8	3.3	-7.8
296	-8.0	3.1	13.6	22.9	30.5	35.7	37.5	35.7	30.5	22.9	13.6	3.1	-8.0
297	-8.2	2.9	13.3	22.6	30.2	35.3	37.1	35.3	30.2	22.6	13.3	2.9	-8.2
298	-8.5	2.6	13.1	22.4	29.9	35.0	36.8	35.0	29.9	22.4	13.1	2.6	-8.5
299	-8.7	2.4	12.8	22.1	29.6	34.7	36.4	34.7	29.6	22.1	12.8	2.4	-8.7
300	-8.9	2.2	12.6	21.8	29.3	34.3	36.1	34.3	29.3	21.8	12.6	2.2	-8.9
301	-9.1	2.0	12.3	21.5	29.0	34.0	35.8	34.0	29.0	21.5	12.3	2.0	-9.1
302	-9.3	1.7	12.1	21.3	28.7	33.7	35.5	33.7	28.7	21.3	12.1	1.7	-9.3
303	-9.5	1.5	11.9	21.0	28.4	33.4	35.1	33.4	28.4	21.0	11.9	1.5	-9.5
304	-9.7	1.3	11.6	20.8	28.2	33.1	34.8	33.1	28.2	20.8	11.6	1.3	-9.7
305	-9.9	1.1	11.4	20.5	27.9	32.8	34.5	32.8	27.9	20.5	11.4	1.1	-9.9

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 275 TO 305

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
275	-3.3	6.2	15.2	23.3	29.8	34.1	35.6	34.1	29.8	23.3	15.2	6.2	-3.3
276	-3.7	5.9	14.9	22.9	29.4	33.7	35.2	33.7	29.4	22.9	14.9	5.9	-3.7
277	-4.0	5.5	14.5	22.5	29.0	33.3	34.8	33.3	29.0	22.5	14.5	5.5	-4.0
278	-4.3	5.2	14.2	22.2	28.6	32.9	34.4	32.9	28.6	22.2	14.2	5.2	-4.3
279	-4.6	4.9	13.9	21.8	28.3	32.5	34.0	32.5	28.3	21.8	13.9	4.9	-4.6
280	-4.9	4.6	13.5	21.5	27.9	32.1	33.6	32.1	27.9	21.5	13.5	4.6	-4.9
281	-5.2	4.3	13.2	21.1	27.5	31.7	33.2	31.7	27.5	21.1	13.2	4.3	-5.2
282	-5.5	3.9	12.9	20.8	27.1	31.3	32.8	31.3	27.1	20.8	12.9	3.9	-5.5
283	-5.8	3.6	12.5	20.4	26.7	30.9	32.4	30.9	26.7	20.4	12.5	3.6	-5.8
284	-6.1	3.3	12.2	20.1	26.4	30.5	32.0	30.5	26.4	20.1	12.2	3.3	-6.1
285	-6.4	3.0	11.9	19.7	26.0	30.1	31.6	30.1	26.0	19.7	11.9	3.0	-6.4
286	-6.7	2.7	11.5	19.4	25.6	29.7	31.2	29.7	25.6	19.4	11.5	2.7	-6.7
287	-7.0	2.4	11.2	19.0	25.3	29.4	30.8	29.4	25.3	19.0	11.2	2.4	-7.0
288	-7.3	2.1	10.9	18.7	24.9	29.0	30.4	29.0	24.9	18.7	10.9	2.1	-7.3
289	-7.6	1.8	10.6	18.4	24.6	28.6	30.0	28.6	24.6	18.4	10.6	1.8	-7.6
290	-7.9	1.5	10.3	18.0	24.2	28.2	29.7	28.2	24.2	18.0	10.3	1.5	-7.9
291	-8.2	1.2	10.0	17.7	23.9	27.9	29.3	27.9	23.9	17.7	10.0	1.2	-8.2
292	-8.5	0.9	9.7	17.4	23.5	27.5	28.9	27.5	23.5	17.4	9.7	0.9	-8.5
293	-8.8	0.6	9.4	17.1	23.2	27.2	28.5	27.2	23.2	17.1	9.4	0.6	-8.8
294	-9.0	0.3	9.1	16.7	22.8	26.8	28.2	26.8	22.8	16.7	9.1	0.3	-9.0
295	-9.3	0.1	8.8	16.4	22.5	26.4	27.8	26.4	22.5	16.4	8.8	0.1	-9.3
296	-9.6	-0.2	8.5	16.1	22.2	26.1	27.5	26.1	22.2	16.1	8.5	-0.2	-9.6
297	-9.8	-0.5	8.2	15.8	21.8	25.8	27.1	25.8	21.8	15.8	8.2	-0.5	-9.8
298	-10.1	-0.8	7.9	15.5	21.5	25.4	26.8	25.4	21.5	15.5	7.9	-0.8	-10.1
299	-10.3	-1.0	7.6	15.2	21.2	25.1	26.4	25.1	21.2	15.2	7.6	-1.0	-10.3
300	-10.6	-1.3	7.4	14.9	20.9	24.8	26.1	24.8	20.9	14.9	7.4	-1.3	-10.6
301	-10.8	-1.5	7.1	14.6	20.6	24.4	25.8	24.4	20.6	14.6	7.1	-1.5	-10.8
302	-11.1	-1.8	6.8	14.3	20.3	24.1	25.5	24.1	20.3	14.3	6.8	-1.8	-11.1
303	-11.3	-2.0	6.6	14.1	20.0	23.8	25.1	23.8	20.0	14.1	6.6	-2.0	-11.3
304	-11.6	-2.3	6.3	13.8	19.7	23.5	24.8	23.5	19.7	13.8	6.3	-2.3	-11.6
305	-11.8	-2.5	6.0	13.5	19.4	23.2	24.5	23.2	19.4	13.5	6.0	-2.5	-11.8

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 275 TO 305

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
275	-3.8	3.6	10.6	16.7	21.5	24.6	25.6	24.6	21.5	16.7	10.6	3.6	-3.8
276	-4.1	3.3	10.2	16.3	21.1	24.2	25.2	24.2	21.1	16.3	10.2	3.3	-4.1
277	-4.5	2.9	9.8	15.9	20.7	23.7	24.8	23.7	20.7	15.9	9.8	2.9	-4.5
278	-4.8	2.5	9.5	15.5	20.3	23.3	24.4	23.3	20.3	15.5	9.5	2.5	-4.8
279	-5.2	2.2	9.1	15.1	19.9	22.9	24.0	22.9	19.9	15.1	9.1	2.2	-5.2
280	-5.6	1.8	8.7	14.7	19.5	22.5	23.6	22.5	19.5	14.7	8.7	1.8	-5.6
281	-5.9	1.5	8.4	14.4	19.1	22.1	23.2	22.1	19.1	14.4	8.4	1.5	-5.9
282	-6.3	1.1	8.0	14.0	18.7	21.7	22.8	21.7	18.7	14.0	8.0	1.1	-6.3
283	-6.6	0.8	7.6	13.6	18.3	21.3	22.4	21.3	18.3	13.6	7.6	0.8	-6.6
284	-6.9	0.4	7.3	13.2	17.9	20.9	22.0	20.9	17.9	13.2	7.3	0.4	-6.9
285	-7.3	0.1	6.9	12.9	17.5	20.5	21.6	20.5	17.5	12.9	6.9	0.1	-7.3
286	-7.6	-0.3	6.6	12.5	17.2	20.2	21.2	20.2	17.2	12.5	6.6	-0.3	-7.6
287	-8.0	-0.6	6.2	12.1	16.8	19.8	20.8	19.8	16.8	12.1	6.2	-0.6	-8.0
288	-8.3	-1.0	5.9	11.8	16.4	19.4	20.4	19.4	16.4	11.8	5.9	-1.0	-8.3
289	-8.6	-1.3	5.5	11.4	16.1	19.0	20.0	19.0	16.1	11.4	5.5	-1.3	-8.6
290	-8.9	-1.6	5.2	11.1	15.7	18.6	19.7	18.6	15.7	11.1	5.2	-1.6	-8.9
291	-9.3	-1.9	4.8	10.7	15.3	18.3	19.3	18.3	15.3	10.7	4.8	-1.9	-9.3
292	-9.6	-2.3	4.5	10.4	15.0	17.9	18.9	17.9	15.0	10.4	4.5	-2.3	-9.6
293	-9.9	-2.6	4.2	10.0	14.6	17.5	18.5	17.5	14.6	10.0	4.2	-2.6	-9.9
294	-10.2	-2.9	3.9	9.7	14.3	17.2	18.2	17.2	14.3	9.7	3.9	-2.9	-10.2
295	-10.5	-3.2	3.5	9.4	13.9	16.8	17.8	16.8	13.9	9.4	3.5	-3.2	-10.5
296	-10.8	-3.5	3.2	9.1	13.6	16.5	17.5	16.5	13.6	9.1	3.2	-3.5	-10.8
297	-11.1	-3.8	2.9	8.7	13.2	16.1	17.1	16.1	13.2	8.7	2.9	-3.8	-11.1
298	-11.4	-4.1	2.6	8.4	12.9	15.8	16.8	15.8	12.9	8.4	2.6	-4.1	-11.4
299	-11.7	-4.4	2.3	8.1	12.6	15.5	16.4	15.5	12.6	8.1	2.3	-4.4	-11.7
300	-12.0	-4.7	2.0	7.8	12.3	15.1	16.1	15.1	12.3	7.8	2.0	-4.7	-12.0
301	-12.3	-5.0	1.7	7.5	11.9	14.8	15.8	14.8	11.9	7.5	1.7	-5.0	-12.3
302	-12.6	-5.3	1.4	7.2	11.6	14.5	15.5	14.5	11.6	7.2	1.4	-5.3	-12.6
303	-12.8	-5.6	1.1	6.9	11.3	14.2	15.1	14.2	11.3	6.9	1.1	-5.6	-12.8
304	-13.1	-5.8	0.8	6.6	11.0	13.9	14.8	13.9	11.0	6.6	0.8	-5.8	-13.1
305	-13.4	-6.1	0.6	6.3	10.7	13.5	14.5	13.5	10.7	6.3	0.6	-6.1	-13.4

APPENDIX K

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 306 TO 335

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 306 TO 335

	LOCAL STANDARD TIME											
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
306	-5.3	8.1	21.0	33.1	43.6	51.3	54.2	51.3	43.6	33.1	21.0	8.1	-5.3
307	-5.4	8.0	20.9	32.9	43.4	51.0	53.9	51.0	43.4	32.9	20.9	8.0	-5.4
308	-5.5	7.9	20.8	32.8	43.2	50.8	53.6	50.8	43.2	32.8	20.8	7.9	-5.5
309	-5.6	7.8	20.6	32.6	43.0	50.5	53.3	50.5	43.0	32.6	20.6	7.8	-5.6
310	-5.7	7.6	20.5	32.4	42.7	50.2	53.1	50.2	42.7	32.4	20.5	7.6	-5.7
311	-5.8	7.5	20.3	32.2	42.5	50.0	52.8	50.0	42.5	32.2	20.3	7.5	-5.8
312	-5.9	7.4	20.2	32.1	42.3	49.7	52.5	49.7	42.3	32.1	20.2	7.4	-5.9
313	-6.0	7.3	20.1	31.9	42.1	49.5	52.2	49.5	42.1	31.9	20.1	7.3	-6.0
314	-6.1	7.2	19.9	31.7	41.9	49.2	52.0	49.2	41.9	31.7	19.9	7.2	-6.1
315	-6.2	7.1	19.8	31.6	41.7	49.0	51.7	49.0	41.7	31.6	19.8	7.1	-6.2
316	-6.2	7.0	19.7	31.4	41.5	48.8	51.5	48.8	41.5	31.4	19.7	7.0	-6.2
317	-6.3	6.9	19.6	31.3	41.3	48.5	51.2	48.5	41.3	31.3	19.6	6.9	-6.3
318	-6.4	6.8	19.4	31.1	41.2	48.3	51.0	48.3	41.2	31.1	19.4	6.8	-6.4
319	-6.5	6.7	19.3	31.0	41.0	48.1	50.8	48.1	41.0	31.0	19.3	6.7	-6.5
320	-6.5	6.6	19.2	30.8	40.8	47.9	50.6	47.9	40.8	30.8	19.2	6.6	-6.5
321	-6.6	6.5	19.1	30.7	40.6	47.7	50.3	47.7	40.6	30.7	19.1	6.5	-6.6
322	-6.7	6.5	19.0	30.6	40.5	47.5	50.1	47.5	40.5	30.6	19.0	6.5	-6.7
323	-6.7	6.4	18.9	30.4	40.3	47.3	49.9	47.3	40.3	30.4	18.9	6.4	-6.7
324	-6.8	6.3	18.8	30.3	40.2	47.1	49.7	47.1	40.2	30.3	18.8	6.3	-6.8
325	-6.9	6.2	18.7	30.2	40.0	46.9	49.5	46.9	40.0	30.2	18.7	6.2	-6.9
326	-6.9	6.1	18.6	30.1	39.8	46.8	49.3	46.8	39.8	30.1	18.6	6.1	-6.9
327	-7.0	6.1	18.5	30.0	39.7	46.6	49.2	46.6	39.7	30.0	18.5	6.1	-7.0
328	-7.0	6.0	18.4	29.8	39.6	46.4	49.0	46.4	39.6	29.8	18.4	6.0	-7.0
329	-7.1	5.9	18.3	29.7	39.4	46.3	48.8	46.3	39.4	29.7	18.3	5.9	-7.1
330	-7.2	5.9	18.2	29.6	39.3	46.1	48.6	46.1	39.3	29.6	18.2	5.9	-7.2
331	-7.2	5.8	18.2	29.5	39.2	46.0	48.5	46.0	39.2	29.5	18.2	5.8	-7.2
332	-7.3	5.7	18.1	29.4	39.1	45.8	48.3	45.8	39.1	29.4	18.1	5.7	-7.3
333	-7.3	5.7	18.0	29.3	38.9	45.7	48.2	45.7	38.9	29.3	18.0	5.7	-7.3
334	-7.3	5.6	17.9	29.2	38.8	45.6	48.1	45.6	38.8	29.2	17.9	5.6	-7.3
335	-7.4	5.6	17.9	29.2	38.7	45.4	47.9	45.4	38.7	29.2	17.9	5.6	-7.4

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 306 TO 335

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
306	-7.8	4.6	16.3	27.0	35.9	42.0	44.2	42.0	35.9	27.0	16.3	4.5	-7.8
307	-8.0	4.4	16.1	26.7	35.6	41.7	43.9	41.7	35.6	26.7	16.1	4.4	-8.0
308	-8.1	4.2	15.9	26.5	35.4	41.4	43.6	41.4	35.4	26.5	15.9	4.2	-8.1
309	-8.2	4.1	15.8	26.3	35.1	41.1	43.3	41.1	35.1	26.3	15.8	4.1	-8.2
310	-8.4	3.9	15.6	26.1	34.9	40.9	43.1	40.9	34.9	26.1	15.6	3.9	-8.4
311	-8.5	3.8	15.4	25.9	34.6	40.6	42.8	40.6	34.6	25.9	15.4	3.8	-8.5
312	-8.6	3.6	15.2	25.7	34.4	40.4	42.5	40.4	34.4	25.7	15.2	3.6	-8.6
313	-8.8	3.5	15.1	25.5	34.2	40.1	42.2	40.1	34.2	25.5	15.1	3.5	-8.8
314	-8.9	3.4	14.9	25.3	34.0	39.9	42.0	39.9	34.0	25.3	14.9	3.4	-8.9
315	-9.0	3.2	14.7	25.1	33.7	39.6	41.7	39.6	33.7	25.1	14.7	3.2	-9.0
316	-9.1	3.1	14.6	25.0	33.5	39.4	41.5	39.4	33.5	25.0	14.6	3.1	-9.1
317	-9.3	3.0	14.4	24.8	33.3	39.1	41.2	39.1	33.3	24.8	14.4	3.0	-9.3
318	-9.4	2.8	14.3	24.6	33.1	38.9	41.0	38.9	33.1	24.6	14.3	2.8	-9.4
319	-9.5	2.7	14.1	24.4	32.9	38.7	40.8	38.7	32.9	24.4	14.1	2.7	-9.5
320	-9.6	2.6	14.0	24.3	32.7	38.5	40.6	38.5	32.7	24.3	14.0	2.6	-9.6
321	-9.7	2.5	13.9	24.1	32.6	38.3	40.3	38.3	32.6	24.1	13.9	2.5	-9.7
322	-9.8	2.3	13.7	23.9	32.4	38.1	40.1	38.1	32.4	23.9	13.7	2.3	-9.8
323	-9.9	2.2	13.6	23.8	32.2	37.9	39.9	37.9	32.2	23.8	13.6	2.2	-9.9
324	-10.0	2.1	13.5	23.6	32.0	37.7	39.7	37.7	32.0	23.6	13.5	2.1	-10.0
325	-10.1	2.0	13.3	23.5	31.9	37.5	39.5	37.5	31.9	23.5	13.3	2.0	-10.1
326	-10.2	1.9	13.2	23.4	31.7	37.3	39.3	37.3	31.7	23.4	13.2	1.9	-10.2
327	-10.2	1.8	13.1	23.2	31.5	37.1	39.2	37.1	31.5	23.2	13.1	1.8	-10.2
328	-10.3	1.7	13.0	23.1	31.4	37.0	39.0	37.0	31.4	23.1	13.0	1.7	-10.3
329	-10.4	1.6	12.9	23.0	31.2	36.8	38.8	36.8	31.2	23.0	12.9	1.6	-10.4
330	-10.5	1.5	12.8	22.8	31.1	36.7	38.6	36.7	31.1	22.8	12.8	1.5	-10.5
331	-10.6	1.4	12.7	22.7	31.0	36.5	38.5	36.5	31.0	22.7	12.7	1.4	-10.6
332	-10.6	1.4	12.6	22.6	30.8	36.4	38.3	36.4	30.8	22.6	12.6	1.4	-10.6
333	-10.7	1.3	12.5	22.5	30.7	36.2	38.2	36.2	30.7	22.5	12.5	1.3	-10.7
334	-10.8	1.2	12.4	22.4	30.6	36.1	38.1	36.1	30.6	22.4	12.4	1.2	-10.8
335	-10.8	1.1	12.3	22.3	30.5	36.0	37.9	36.0	30.5	22.3	12.3	1.1	-10.8

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 306 TO 335

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
306	-10.1	0.9	11.2	20.3	27.6	32.5	34.2	32.5	27.6	20.3	11.2	0.9	-10.1
307	-10.3	0.7	11.0	20.0	27.3	32.2	33.9	32.2	27.3	20.0	11.0	0.7	-10.3
308	-10.4	0.5	10.7	19.8	27.1	31.9	33.6	31.9	27.1	19.8	10.7	0.5	-10.4
309	-10.6	0.3	10.5	19.5	26.8	31.6	33.3	31.6	26.8	19.5	10.5	0.3	-10.6
310	-10.8	0.1	10.3	19.3	26.6	31.4	33.1	31.4	26.6	19.3	10.3	0.1	-10.8
311	-11.0	-0.1	10.1	19.1	26.3	31.1	32.8	31.1	26.3	19.1	10.1	-0.1	-11.0
312	-11.1	-0.2	9.9	18.9	26.1	30.8	32.5	30.8	26.1	18.9	9.9	-0.2	-11.1
313	-11.3	-0.4	9.7	18.7	25.8	30.6	32.2	30.6	25.8	18.7	9.7	-0.4	-11.3
314	-11.5	-0.6	9.5	18.4	25.6	30.3	32.0	30.3	25.6	18.4	9.5	-0.6	-11.5
315	-11.6	-0.8	9.3	18.2	25.4	30.1	31.7	30.1	25.4	18.2	9.3	-0.8	-11.6
316	-11.8	-0.9	9.2	18.0	25.1	29.8	31.5	29.8	25.1	18.0	9.2	-0.9	-11.8
317	-11.9	-1.1	9.0	17.8	24.9	29.6	31.2	29.6	24.9	17.8	9.0	-1.1	-11.9
318	-12.1	-1.2	8.8	17.6	24.7	29.4	31.0	29.4	24.7	17.6	8.8	-1.2	-12.1
319	-12.2	-1.4	8.6	17.5	24.5	29.2	30.8	29.2	24.5	17.5	8.6	-1.4	-12.2
320	-12.4	-1.5	8.5	17.3	24.3	28.9	30.6	28.9	24.3	17.3	8.5	-1.5	-12.4
321	-12.5	-1.7	8.3	17.1	24.1	28.7	30.3	28.7	24.1	17.1	8.3	-1.7	-12.5
322	-12.6	-1.8	8.1	16.9	23.9	28.5	30.1	28.5	23.9	16.9	8.1	-1.8	-12.6
323	-12.7	-2.0	8.0	16.7	23.7	28.3	29.9	28.3	23.7	16.7	8.0	-2.0	-12.7
324	-12.9	-2.1	7.8	16.6	23.5	28.1	29.7	28.1	23.5	16.6	7.8	-2.1	-12.9
325	-13.0	-2.2	7.7	16.4	23.4	27.9	29.5	27.9	23.4	16.4	7.7	-2.2	-13.0
326	-13.1	-2.4	7.6	16.3	23.2	27.7	29.3	27.7	23.2	16.3	7.6	-2.4	-13.1
327	-13.2	-2.5	7.4	16.1	23.0	27.6	29.2	27.6	23.0	16.1	7.4	-2.5	-13.2
328	-13.3	-2.6	7.3	16.0	22.9	27.4	29.0	27.4	22.9	16.0	7.3	-2.6	-13.3
329	-13.4	-2.7	7.2	15.8	22.7	27.2	28.8	27.2	22.7	15.8	7.2	-2.7	-13.4
330	-13.5	-2.8	7.0	15.7	22.6	27.1	28.6	27.1	22.6	15.7	7.0	-2.8	-13.5
331	-13.6	-2.9	6.9	15.6	22.4	26.9	28.5	26.9	22.4	15.6	6.9	-2.9	-13.6
332	-13.7	-3.0	6.8	15.4	22.3	26.8	28.3	26.8	22.3	15.4	6.8	-3.0	-13.7
333	-13.8	-3.1	6.7	15.3	22.2	26.6	28.2	26.6	22.2	15.3	6.7	-3.1	-13.8
334	-13.9	-3.2	6.6	15.2	22.0	26.5	28.1	26.5	22.0	15.2	6.6	-3.2	-13.9
335	-14.0	-3.3	6.5	15.1	21.9	26.4	27.9	26.4	21.9	15.1	6.5	-3.3	-14.0

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 306 TO 335

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
306	-12.0	-2.8	5.8	13.2	19.1	22.9	24.2	22.9	19.1	13.2	5.8	-2.8	-12.0
307	-12.3	-3.0	5.5	13.0	18.8	22.6	23.9	22.6	18.8	13.0	5.5	-3.0	-12.3
308	-12.5	-3.2	5.3	12.7	18.5	22.3	23.6	22.3	18.5	12.7	5.3	-3.2	-12.5
309	-12.7	-3.5	5.1	12.5	18.3	22.0	23.3	22.0	18.3	12.5	5.1	-3.5	-12.7
310	-12.9	-3.7	4.8	12.2	18.0	21.8	23.1	21.8	18.0	12.2	4.8	-3.7	-12.9
311	-13.1	-3.9	4.6	12.0	17.8	21.5	22.8	21.5	17.8	12.0	4.6	-3.9	-13.1
312	-13.3	-4.1	4.4	11.7	17.5	21.2	22.5	21.2	17.5	11.7	4.4	-4.1	-13.3
313	-13.5	-4.3	4.2	11.5	17.3	21.0	22.2	21.0	17.3	11.5	4.2	-4.3	-13.5
314	-13.7	-4.5	3.9	11.3	17.0	20.7	22.0	20.7	17.0	11.3	3.9	-4.5	-13.7
315	-13.9	-4.7	3.7	11.0	16.8	20.5	21.7	20.5	16.8	11.0	3.7	-4.7	-13.9
316	-14.1	-4.9	3.5	10.8	16.5	20.2	21.5	20.2	16.5	10.8	3.5	-4.9	-14.1
317	-14.3	-5.1	3.3	10.6	16.3	20.0	21.2	20.0	16.3	10.6	3.3	-5.1	-14.3
318	-14.4	-5.3	3.1	10.4	16.1	19.7	21.0	19.7	16.1	10.4	3.1	-5.3	-14.4
319	-14.6	-5.5	2.9	10.2	15.9	19.5	20.8	19.5	15.9	10.2	2.9	-5.5	-14.6
320	-14.8	-5.6	2.8	10.0	15.7	19.3	20.6	19.3	15.7	10.0	2.8	-5.6	-14.8
321	-14.9	-5.8	2.6	9.8	15.5	19.1	20.3	19.1	15.5	9.8	2.6	-5.8	-14.9
322	-15.1	-6.0	2.4	9.6	15.3	18.9	20.1	18.9	15.3	9.6	2.4	-6.0	-15.1
323	-15.2	-6.1	2.2	9.4	15.1	18.7	19.9	18.7	15.1	9.4	2.2	-6.1	-15.2
324	-15.4	-6.3	2.1	9.3	14.9	18.5	19.7	18.5	14.9	9.3	2.1	-6.3	-15.4
325	-15.5	-6.4	1.9	9.1	14.7	18.3	19.5	18.3	14.7	9.1	1.9	-6.4	-15.5
326	-15.7	-6.6	1.7	8.9	14.5	18.1	19.3	18.1	14.5	8.9	1.7	-6.6	-15.7
327	-15.8	-6.7	1.6	8.8	14.3	17.9	19.2	17.9	14.3	8.8	1.6	-6.7	-15.8
328	-15.9	-6.9	1.4	8.6	14.2	17.7	19.0	17.7	14.2	8.6	1.4	-6.9	-15.9
329	-16.1	-7.0	1.3	8.4	14.0	17.6	18.8	17.6	14.0	8.4	1.3	-7.0	-16.1
330	-16.2	-7.1	1.2	8.3	13.9	17.4	18.6	17.4	13.9	8.3	1.2	-7.1	-16.2
331	-16.3	-7.2	1.0	8.2	13.7	17.3	18.5	17.3	13.7	8.2	1.0	-7.2	-16.3
332	-16.4	-7.4	0.9	8.0	13.6	17.1	18.3	17.1	13.6	8.0	0.9	-7.4	-16.4
333	-16.5	-7.5	0.8	7.9	13.4	17.0	18.2	17.0	13.4	7.9	0.8	-7.5	-16.5
334	-16.6	-7.6	0.7	7.8	13.3	16.8	18.1	16.8	13.3	7.8	0.7	-7.6	-16.6
335	-16.7	-7.7	0.6	7.7	13.2	16.7	17.9	16.7	13.2	7.7	0.6	-7.7	-16.7

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 306 TO 335

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
306	-13.6	-6.4	0.3	6.0	10.4	13.2	14.2	13.2	10.4	6.0	0.3	-6.4	-13.6
307	-13.9	-6.6	0.0	5.7	10.1	13.0	13.9	13.0	10.1	5.7	0.0	-6.6	-13.9
308	-14.1	-6.9	-0.2	5.5	9.9	12.7	13.6	12.7	9.9	5.5	-0.2	-6.9	-14.1
309	-14.4	-7.1	-0.5	5.2	9.6	12.4	13.3	12.4	9.6	5.2	-0.5	-7.1	-14.4
310	-14.6	-7.4	-0.8	4.9	9.3	12.1	13.1	12.1	9.3	4.9	-0.8	-7.4	-14.6
311	-14.9	-7.6	-1.0	4.7	9.0	11.8	12.8	11.8	9.0	4.7	-1.0	-7.6	-14.9
312	-15.1	-7.9	-1.3	4.4	8.8	11.6	12.5	11.6	8.8	4.4	-1.3	-7.9	-15.1
313	-15.3	-8.1	-1.5	4.2	8.5	11.3	12.2	11.3	8.5	4.2	-1.5	-8.1	-15.3
314	-15.5	-8.3	-1.7	3.9	8.3	11.0	12.0	11.0	8.3	3.9	-1.7	-8.3	-15.5
315	-15.7	-8.5	-1.9	3.7	8.0	10.8	11.7	10.8	8.0	3.7	-1.9	-8.5	-15.7
316	-16.0	-8.8	-2.2	3.5	7.8	10.5	11.5	10.5	7.8	3.5	-2.2	-8.8	-16.0
317	-16.2	-9.0	-2.4	3.2	7.6	10.3	11.2	10.3	7.6	3.2	-2.4	-9.0	-16.2
318	-16.4	-9.2	-2.6	3.0	7.3	10.1	11.0	10.1	7.3	3.0	-2.6	-9.2	-16.4
319	-16.6	-9.4	-2.8	2.8	7.1	9.8	10.8	9.8	7.1	2.8	-2.8	-9.4	-16.6
320	-16.8	-9.6	-3.0	2.6	6.9	9.6	10.6	9.6	6.9	2.6	-3.0	-9.6	-16.8
321	-16.9	-9.8	-3.2	2.4	6.7	9.4	10.3	9.4	6.7	2.4	-3.2	-9.8	-16.9
322	-17.1	-9.9	-3.4	2.2	6.5	9.2	10.1	9.2	6.5	2.2	-3.4	-9.9	-17.1
323	-17.3	-10.1	-3.6	2.0	6.3	9.0	9.9	9.0	6.3	2.0	-3.6	-10.1	-17.3
324	-17.5	-10.3	-3.8	1.8	6.1	8.8	9.7	8.8	6.1	1.8	-3.8	-10.3	-17.5
325	-17.6	-10.5	-3.9	1.6	5.9	8.6	9.5	8.6	5.9	1.6	-3.9	-10.5	-17.6
326	-17.8	-10.6	-4.1	1.4	5.7	8.4	9.3	8.4	5.7	1.4	-4.1	-10.6	-17.8
327	-17.9	-10.8	-4.3	1.3	5.5	8.2	9.2	8.2	5.5	1.3	-4.3	-10.8	-17.9
328	-18.1	-10.9	-4.4	1.1	5.4	8.1	9.0	8.1	5.4	1.1	-4.4	-10.9	-18.1
329	-18.2	-11.1	-4.6	1.0	5.2	7.9	8.8	7.9	5.2	1.0	-4.6	-11.1	-18.2
330	-18.4	-11.2	-4.7	0.8	5.0	7.7	8.6	7.7	5.0	0.8	-4.7	-11.2	-18.4
331	-18.5	-11.4	-4.9	0.7	4.9	7.6	8.5	7.6	4.9	0.7	-4.9	-11.4	-18.5
332	-18.6	-11.5	-5.0	0.5	4.7	7.4	8.3	7.4	4.7	0.5	-5.0	-11.5	-18.6
333	-18.8	-11.6	-5.1	0.4	4.6	7.3	8.2	7.3	4.6	0.4	-5.1	-11.6	-18.8
334	-18.9	-11.7	-5.3	0.2	4.5	7.1	8.1	7.1	4.5	0.2	-5.3	-11.7	-18.9
335	-19.0	-11.9	-5.4	0.1	4.3	7.0	7.9	7.0	4.3	0.1	-5.4	-11.9	-19.0

APPENDIX L

SOLAR ELEVATION ANGLE FOR 20 TO 60 DEGREES NORTH LATITUDE JULIAN DATES: 336 TO 366

SOLAR ELEVATION ANGLE FOR
20 DEGREES NORTH LATITUDE
JULIAN DATES: 336 TO 366

	LOCAL STANDARD TIME											
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
336	-7.4	5.5	17.8	29.1	38.6	45.3	47.8	45.3	38.6	29.1	17.8	5.5	-7.4
337	-7.5	5.5	17.7	29.0	38.5	45.2	47.7	45.2	38.5	29.0	17.7	5.5	-7.5
338	-7.5	5.4	17.7	28.9	38.4	45.1	47.6	45.1	38.4	28.9	17.7	5.4	-7.5
339	-7.5	5.4	17.6	28.8	38.3	45.0	47.5	45.0	38.3	28.8	17.6	5.4	-7.5
340	-7.6	5.3	17.6	28.8	38.3	44.9	47.3	44.9	38.3	28.8	17.6	5.3	-7.6
341	-7.6	5.3	17.5	28.7	38.2	44.8	47.3	44.8	38.2	28.7	17.5	5.3	-7.6
342	-7.6	5.2	17.5	28.7	38.1	44.7	47.2	44.7	38.1	28.7	17.5	5.2	-7.6
343	-7.7	5.2	17.4	28.6	38.0	44.7	47.1	44.7	38.0	28.6	17.4	5.2	-7.7
344	-7.7	5.2	17.4	28.6	38.0	44.6	47.0	44.6	38.0	28.6	17.4	5.2	-7.7
345	-7.7	5.1	17.4	28.5	37.9	44.5	46.9	44.5	37.9	28.5	17.4	5.1	-7.7
346	-7.7	5.1	17.3	28.5	37.9	44.5	46.9	44.5	37.9	28.5	17.3	5.1	-7.7
347	-7.7	5.1	17.3	28.4	37.8	44.4	46.8	44.4	37.8	28.4	17.3	5.1	-7.7
348	-7.8	5.1	17.3	28.4	37.8	44.3	46.8	44.3	37.8	28.4	17.3	5.1	-7.8
349	-7.8	5.1	17.2	28.4	37.8	44.3	46.7	44.3	37.8	28.4	17.2	5.1	-7.8
350	-7.8	5.0	17.2	28.3	37.7	44.3	46.7	44.3	37.7	28.3	17.2	5.0	-7.8
351	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
352	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
353	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
354	-7.8	5.0	17.2	28.3	37.6	44.2	46.6	44.2	37.6	28.3	17.2	5.0	-7.8
355	-7.8	5.0	17.2	28.3	37.6	44.2	46.6	44.2	37.6	28.3	17.2	5.0	-7.8
356	-7.8	5.0	17.2	28.3	37.6	44.2	46.6	44.2	37.6	28.3	17.2	5.0	-7.8
357	-7.8	5.0	17.2	28.3	37.6	44.2	46.6	44.2	37.6	28.3	17.2	5.0	-7.8
358	-7.8	5.0	17.2	28.3	37.6	44.2	46.6	44.2	37.6	28.3	17.2	5.0	-7.8
359	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
360	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
361	-7.8	5.0	17.2	28.3	37.7	44.2	46.6	44.2	37.7	28.3	17.2	5.0	-7.8
362	-7.8	5.0	17.2	28.3	37.7	44.3	46.7	44.3	37.7	28.3	17.2	5.0	-7.8
363	-7.8	5.1	17.2	28.4	37.8	44.3	46.7	44.3	37.8	28.4	17.2	5.1	-7.8
364	-7.8	5.1	17.3	28.4	37.8	44.3	46.8	44.3	37.8	28.4	17.3	5.1	-7.8
365	-7.7	5.1	17.3	28.4	37.8	44.4	46.8	44.4	37.8	28.4	17.3	5.1	-7.7
366	-7.7	5.1	17.3	28.5	37.9	44.5	46.9	44.5	37.9	28.5	17.3	5.1	-7.7

SOLAR ELEVATION ANGLE FOR
30 DEGREES NORTH LATITUDE
JULIAN DATES: 336 TO 366

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
336	-10.9	1.1	12.2	22.2	30.4	35.8	37.8	35.8	30.4	22.2	12.2	1.1	-10.9
337	-10.9	1.0	12.2	22.1	30.3	35.7	37.7	35.7	30.3	22.1	12.2	1.0	-10.9
338	-11.0	0.9	12.1	22.0	30.2	35.6	37.6	35.6	30.2	22.0	12.1	0.9	-11.0
339	-11.1	0.9	12.0	22.0	30.1	35.5	37.5	35.5	30.1	22.0	12.0	0.9	-11.1
340	-11.1	0.8	11.9	21.9	30.0	35.4	37.3	35.4	30.0	21.9	11.9	0.8	-11.1
341	-11.1	0.8	11.9	21.8	29.9	35.3	37.3	35.3	29.9	21.8	11.9	0.8	-11.1
342	-11.2	0.7	11.8	21.7	29.8	35.2	37.2	35.2	29.8	21.7	11.8	0.7	-11.2
343	-11.2	0.7	11.8	21.7	29.7	35.2	37.1	35.2	29.7	21.7	11.8	0.7	-11.2
344	-11.3	0.6	11.7	21.6	29.7	35.1	37.0	35.1	29.7	21.6	11.7	0.6	-11.3
345	-11.3	0.6	11.7	21.6	29.6	35.0	36.9	35.0	29.6	21.6	11.7	0.6	-11.3
346	-11.3	0.6	11.6	21.5	29.6	34.9	36.9	34.9	29.6	21.5	11.6	0.6	-11.3
347	-11.4	0.5	11.6	21.5	29.5	34.9	36.8	34.9	29.5	21.5	11.6	0.5	-11.4
348	-11.4	0.5	11.6	21.4	29.5	34.8	36.8	34.8	29.5	21.4	11.6	0.5	-11.4
349	-11.4	0.5	11.5	21.4	29.4	34.8	36.7	34.8	29.4	21.4	11.5	0.5	-11.4
350	-11.4	0.4	11.5	21.4	29.4	34.8	36.7	34.8	29.4	21.4	11.5	0.4	-11.4
351	-11.4	0.4	11.5	21.3	29.4	34.7	36.6	34.7	29.4	21.3	11.5	0.4	-11.4
352	-11.5	0.4	11.5	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.5	0.4	-11.5
353	-11.5	0.4	11.5	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.5	0.4	-11.5
354	-11.5	0.4	11.4	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.4	0.4	-11.5
355	-11.5	0.4	11.4	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.4	0.4	-11.5
356	-11.5	0.4	11.4	21.3	29.3	34.6	36.6	34.6	29.3	21.3	11.4	0.4	-11.5
357	-11.5	0.4	11.4	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.4	0.4	-11.5
358	-11.5	0.4	11.4	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.4	0.4	-11.5
359	-11.5	0.4	11.5	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.5	0.4	-11.5
360	-11.5	0.4	11.5	21.3	29.3	34.7	36.6	34.7	29.3	21.3	11.5	0.4	-11.5
361	-11.4	0.4	11.5	21.3	29.4	34.7	36.6	34.7	29.4	21.3	11.5	0.4	-11.4
362	-11.4	0.4	11.5	21.4	29.4	34.8	36.7	34.8	29.4	21.4	11.5	0.4	-11.4
363	-11.4	0.5	11.5	21.4	29.4	34.8	36.7	34.8	29.4	21.4	11.5	0.5	-11.4
364	-11.4	0.5	11.6	21.4	29.5	34.8	36.8	34.8	29.5	21.4	11.6	0.5	-11.4
365	-11.4	0.5	11.6	21.5	29.5	34.9	36.8	34.9	29.5	21.5	11.6	0.5	-11.4
366	-11.3	0.6	11.6	21.5	29.6	34.9	36.9	34.9	29.6	21.5	11.6	0.6	-11.3

SOLAR ELEVATION ANGLE FOR
40 DEGREES NORTH LATITUDE
JULIAN DATES: 336 TO 366

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
336	-14.1	-3.4	6.4	15.0	21.8	26.2	27.8	26.2	21.8	15.0	6.4	-3.4	-14.1
337	-14.1	-3.5	6.3	14.9	21.7	26.1	27.7	26.1	21.7	14.9	6.3	-3.5	-14.1
338	-14.2	-3.6	6.2	14.8	21.6	26.0	27.6	26.0	21.6	14.8	6.2	-3.6	-14.2
339	-14.3	-3.6	6.2	14.7	21.5	25.9	27.5	25.9	21.5	14.7	6.2	-3.6	-14.3
340	-14.3	-3.7	6.1	14.6	21.4	25.8	27.3	25.8	21.4	14.6	6.1	-3.7	-14.3
341	-14.4	-3.8	6.0	14.5	21.3	25.7	27.3	25.7	21.3	14.5	6.0	-3.8	-14.4
342	-14.4	-3.8	5.9	14.5	21.2	25.6	27.2	25.6	21.2	14.5	5.9	-3.8	-14.4
343	-14.5	-3.9	5.9	14.4	21.1	25.5	27.1	25.5	21.1	14.4	5.9	-3.9	-14.5
344	-14.5	-3.9	5.8	14.3	21.1	25.5	27.0	25.5	21.1	14.3	5.8	-3.9	-14.5
345	-14.6	-4.0	5.8	14.3	21.0	25.4	26.9	25.4	21.0	14.3	5.8	-4.0	-14.6
346	-14.6	-4.0	5.7	14.2	20.9	25.3	26.9	25.3	20.9	14.2	5.7	-4.0	-14.6
347	-14.7	-4.1	5.7	14.2	20.9	25.3	26.8	25.3	20.9	14.2	5.7	-4.1	-14.7
348	-14.7	-4.1	5.6	14.1	20.8	25.2	26.8	25.2	20.8	14.1	5.6	-4.1	-14.7
349	-14.7	-4.1	5.6	14.1	20.8	25.2	26.7	25.2	20.8	14.1	5.6	-4.1	-14.7
350	-14.7	-4.2	5.6	14.1	20.8	25.1	26.7	25.1	20.8	14.1	5.6	-4.2	-14.7
351	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
352	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
353	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
354	-14.8	-4.2	5.5	14.0	20.7	25.0	26.6	25.0	20.7	14.0	5.5	-4.2	-14.8
355	-14.8	-4.2	5.5	14.0	20.7	25.0	26.6	25.0	20.7	14.0	5.5	-4.2	-14.8
356	-14.8	-4.2	5.5	14.0	20.7	25.0	26.6	25.0	20.7	14.0	5.5	-4.2	-14.8
357	-14.8	-4.2	5.5	14.0	20.7	25.0	26.6	25.0	20.7	14.0	5.5	-4.2	-14.8
358	-14.8	-4.2	5.5	14.0	20.7	25.0	26.6	25.0	20.7	14.0	5.5	-4.2	-14.8
359	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
360	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
361	-14.8	-4.2	5.5	14.0	20.7	25.1	26.6	25.1	20.7	14.0	5.5	-4.2	-14.8
362	-14.7	-4.2	5.6	14.1	20.8	25.1	26.7	25.1	20.8	14.1	5.6	-4.2	-14.7
363	-14.7	-4.1	5.6	14.1	20.8	25.2	26.7	25.2	20.8	14.1	5.6	-4.1	-14.7
364	-14.7	-4.1	5.6	14.1	20.8	25.2	26.8	25.2	20.8	14.1	5.6	-4.1	-14.7
365	-14.7	-4.1	5.7	14.2	20.9	25.3	26.8	25.3	20.9	14.2	5.7	-4.1	-14.7
366	-14.6	-4.0	5.7	14.2	20.9	25.3	26.9	25.3	20.9	14.2	5.7	-4.0	-14.6

SOLAR ELEVATION ANGLE FOR
50 DEGREES NORTH LATITUDE
JULIAN DATES: 336 TO 366

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
336	-16.8	-7.8	0.5	7.5	13.1	16.6	17.8	16.6	13.1	7.5	0.5	-7.8	-16.8
337	-16.9	-7.9	0.4	7.4	12.9	16.5	17.7	16.5	12.9	7.4	0.4	-7.9	-16.9
338	-17.0	-8.0	0.3	7.3	12.8	16.3	17.6	16.3	12.8	7.3	0.3	-8.0	-17.0
339	-17.1	-8.1	0.2	7.2	12.7	16.2	17.5	16.2	12.7	7.2	0.2	-8.1	-17.1
340	-17.2	-8.1	0.1	7.1	12.6	16.1	17.3	16.1	12.6	7.1	0.1	-8.1	-17.2
341	-17.2	-8.2	0.0	7.1	12.5	16.0	17.3	16.0	12.5	7.1	0.0	-8.2	-17.2
342	-17.3	-8.3	-0.1	7.0	12.5	16.0	17.2	16.0	12.5	7.0	-0.1	-8.3	-17.3
343	-17.4	-8.3	-0.1	6.9	12.4	15.9	17.1	15.9	12.4	6.9	-0.1	-8.3	-17.4
344	-17.4	-8.4	-0.2	6.8	12.3	15.8	17.0	15.8	12.3	6.8	-0.2	-8.4	-17.4
345	-17.5	-8.5	-0.3	6.8	12.2	15.7	16.9	15.7	12.2	6.8	-0.3	-8.5	-17.5
346	-17.5	-8.5	-0.3	6.7	12.2	15.7	16.9	15.7	12.2	6.7	-0.3	-8.5	-17.5
347	-17.6	-8.6	-0.4	6.7	12.1	15.6	16.8	15.6	12.1	6.7	-0.4	-8.6	-17.6
348	-17.6	-8.6	-0.4	6.6	12.1	15.6	16.8	15.6	12.1	6.6	-0.4	-8.6	-17.6
349	-17.6	-8.6	-0.4	6.6	12.0	15.5	16.7	15.5	12.0	6.6	-0.4	-8.6	-17.6
350	-17.7	-8.7	-0.5	6.5	12.0	15.5	16.7	15.5	12.0	6.5	-0.5	-8.7	-17.7
351	-17.7	-8.7	-0.5	6.5	12.0	15.4	16.6	15.4	12.0	6.5	-0.5	-8.7	-17.7
352	-17.7	-8.7	-0.5	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.5	-8.7	-17.7
353	-17.7	-8.7	-0.5	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.5	-8.7	-17.7
354	-17.7	-8.7	-0.6	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.6	-8.7	-17.7
355	-17.7	-8.7	-0.6	6.4	11.9	15.4	16.6	15.4	11.9	6.4	-0.6	-8.7	-17.7
356	-17.7	-8.8	-0.6	6.4	11.9	15.4	16.6	15.4	11.9	6.4	-0.6	-8.8	-17.7
357	-17.7	-8.7	-0.6	6.4	11.9	15.4	16.6	15.4	11.9	6.4	-0.6	-8.7	-17.7
358	-17.7	-8.7	-0.6	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.6	-8.7	-17.7
359	-17.7	-8.7	-0.5	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.5	-8.7	-17.7
360	-17.7	-8.7	-0.5	6.5	11.9	15.4	16.6	15.4	11.9	6.5	-0.5	-8.7	-17.7
361	-17.7	-8.7	-0.5	6.5	12.0	15.4	16.6	15.4	12.0	6.5	-0.5	-8.7	-17.7
362	-17.7	-8.7	-0.5	6.5	12.0	15.5	16.7	15.5	12.0	6.5	-0.5	-8.7	-17.7
363	-17.6	-8.6	-0.4	6.6	12.0	15.5	16.7	15.5	12.0	6.6	-0.4	-8.6	-17.6
364	-17.6	-8.6	-0.4	6.6	12.1	15.6	16.8	15.6	12.1	6.6	-0.4	-8.6	-17.6
365	-17.6	-8.6	-0.4	6.7	12.1	15.6	16.8	15.6	12.1	6.7	-0.4	-8.6	-17.6
366	-17.5	-8.5	-0.3	6.7	12.2	15.7	16.9	15.7	12.2	6.7	-0.3	-8.5	-17.5

SOLAR ELEVATION ANGLE FOR
60 DEGREES NORTH LATITUDE
JULIAN DATES: 336 TO 366

	LOCAL STANDARD TIME												
JDATE	06	07	08	09	10	11	12	13	14	15	16	17	18
336	-19.1	-12.0	-5.5	0.0	4.2	6.9	7.8	6.9	4.2	0.0	-5.5	-12.0	-19.1
337	-19.2	-12.1	-5.6	-0.1	4.1	6.8	7.7	6.8	4.1	-0.1	-5.6	-12.1	-19.2
338	-19.3	-12.2	-5.7	-0.2	4.0	6.7	7.6	6.7	4.0	-0.2	-5.7	-12.2	-19.3
339	-19.4	-12.3	-5.8	-0.3	3.9	6.5	7.5	6.5	3.9	-0.3	-5.8	-12.3	-19.4
340	-19.5	-12.4	-5.9	-0.4	3.8	6.4	7.3	6.4	3.8	-0.4	-5.9	-12.4	-19.5
341	-19.6	-12.4	-6.0	-0.5	3.7	6.3	7.3	6.3	3.7	-0.5	-6.0	-12.4	-19.6
342	-19.6	-12.5	-6.1	-0.6	3.6	6.3	7.2	6.3	3.6	-0.6	-6.1	-12.5	-19.6
343	-19.7	-12.6	-6.1	-0.7	3.5	6.2	7.1	6.2	3.5	-0.7	-6.1	-12.6	-19.7
344	-19.8	-12.7	-6.2	-0.7	3.5	6.1	7.0	6.1	3.5	-0.7	-6.2	-12.7	-19.8
345	-19.8	-12.7	-6.3	-0.8	3.4	6.0	6.9	6.0	3.4	-0.8	-6.3	-12.7	-19.8
346	-19.9	-12.8	-6.3	-0.9	3.3	6.0	6.9	6.0	3.3	-0.9	-6.3	-12.8	-19.9
347	-19.9	-12.8	-6.4	-0.9	3.3	5.9	6.8	5.9	3.3	-0.9	-6.4	-12.8	-19.9
348	-20.0	-12.9	-6.4	-1.0	3.2	5.9	6.8	5.9	3.2	-1.0	-6.4	-12.9	-20.0
349	-20.0	-12.9	-6.5	-1.0	3.2	5.8	6.7	5.8	3.2	-1.0	-6.5	-12.9	-20.0
350	-20.1	-13.0	-6.5	-1.1	3.1	5.8	6.7	5.8	3.1	-1.1	-6.5	-13.0	-20.1
351	-20.1	-13.0	-6.5	-1.1	3.1	5.7	6.6	5.7	3.1	-1.1	-6.5	-13.0	-20.1
352	-20.1	-13.0	-6.6	-1.1	3.1	5.7	6.6	5.7	3.1	-1.1	-6.6	-13.0	-20.1
353	-20.1	-13.0	-6.6	-1.1	3.0	5.7	6.6	5.7	3.0	-1.1	-6.6	-13.0	-20.1
354	-20.1	-13.0	-6.6	-1.1	3.0	5.7	6.6	5.7	3.0	-1.1	-6.6	-13.0	-20.1
355	-20.2	-13.0	-6.6	-1.2	3.0	5.7	6.6	5.7	3.0	-1.2	-6.6	-13.0	-20.2
356	-20.2	-13.1	-6.6	-1.2	3.0	5.7	6.6	5.7	3.0	-1.2	-6.6	-13.1	-20.2
357	-20.2	-13.0	-6.6	-1.2	3.0	5.7	6.6	5.7	3.0	-1.2	-6.6	-13.0	-20.2
358	-20.1	-13.0	-6.6	-1.1	3.0	5.7	6.6	5.7	3.0	-1.1	-6.6	-13.0	-20.1
359	-20.1	-13.0	-6.6	-1.1	3.0	5.7	6.6	5.7	3.0	-1.1	-6.6	-13.0	-20.1
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362	-20.1	-13.0	-6.5	-1.1	3.1	5.8	6.7	5.8	3.1	-1.1	-6.5	-13.0	-20.1
363	-20.0	-12.9	-6.5	-1.0	3.2	5.8	6.7	5.8	3.2	-1.0	-6.5	-12.9	-20.0
364	-20.0	-12.9	-6.4	-1.0	3.2	5.9	6.8	5.9	3.2	-1.0	-6.4	-12.9	-20.0
365	-19.9	-12.8	-6.4	-0.9	3.3	5.9	6.8	5.9	3.3	-0.9	-6.4	-12.8	-19.9
366	-19.9	-12.8	-6.3	-0.9	3.3	6.0	6.9	6.0	3.3	-0.9	-6.3	-12.8	-19.9

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