

HILO INTL, HI	
Latitude = 19.72 N	Station ID = ICAO_PHTO
Longitude = 155.05 W	Elevation = 38 Feet
Period of Record = 1988 To 2017	Average Pressure = 29.99 inches Hg

Design Criteria Data

	Mean Coincident (Average) Values				
Dry Bulb Temperature (T)	Design Value (°F)	Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	88	76	113	11	E
0.4% Occurrence	86	75	112	10.3	E
1.0% Occurrence	85	74	108	10	E
2.0% Occurrence	84	74	108	9.9	E
Mean Daily Range	13	-	-	-	SW
97.5% Occurrence	64	61	73	6.1	SW
99.0% Occurrence	63	60	72	6	SW
99.6% Occurrence	62	58	66	6.3	SW
Median of Extreme Lows	59	55	58	6.5	SW

	Design Value (°F)	Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T _{wb})					
Median of Extreme Highs	78	83	132	9.3	E
0.4% Occurrence	77	82	127	9	E
1.0% Occurrence	76	81	122	8.7	E
2.0% Occurrence	75	81	118	8.3	E

	Design Value (gr/lb)	Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)					
Median of Extreme Highs	135	80	0.9	7.5	E
0.4% Occurrence	132	80	0.88	7.3	E
1.0% Occurrence	127	79	0.84	7.2	E
2.0% Occurrence	124	79	0.83	7.3	E

Air Conditioning/ Humid Area Criteria	Threshold	T ≥ 93 °F	T ≥ 80 °F	Twb ≥ 73 °F	Twb ≥ 67 °F
	# of Hours	0	1323	1204	6015

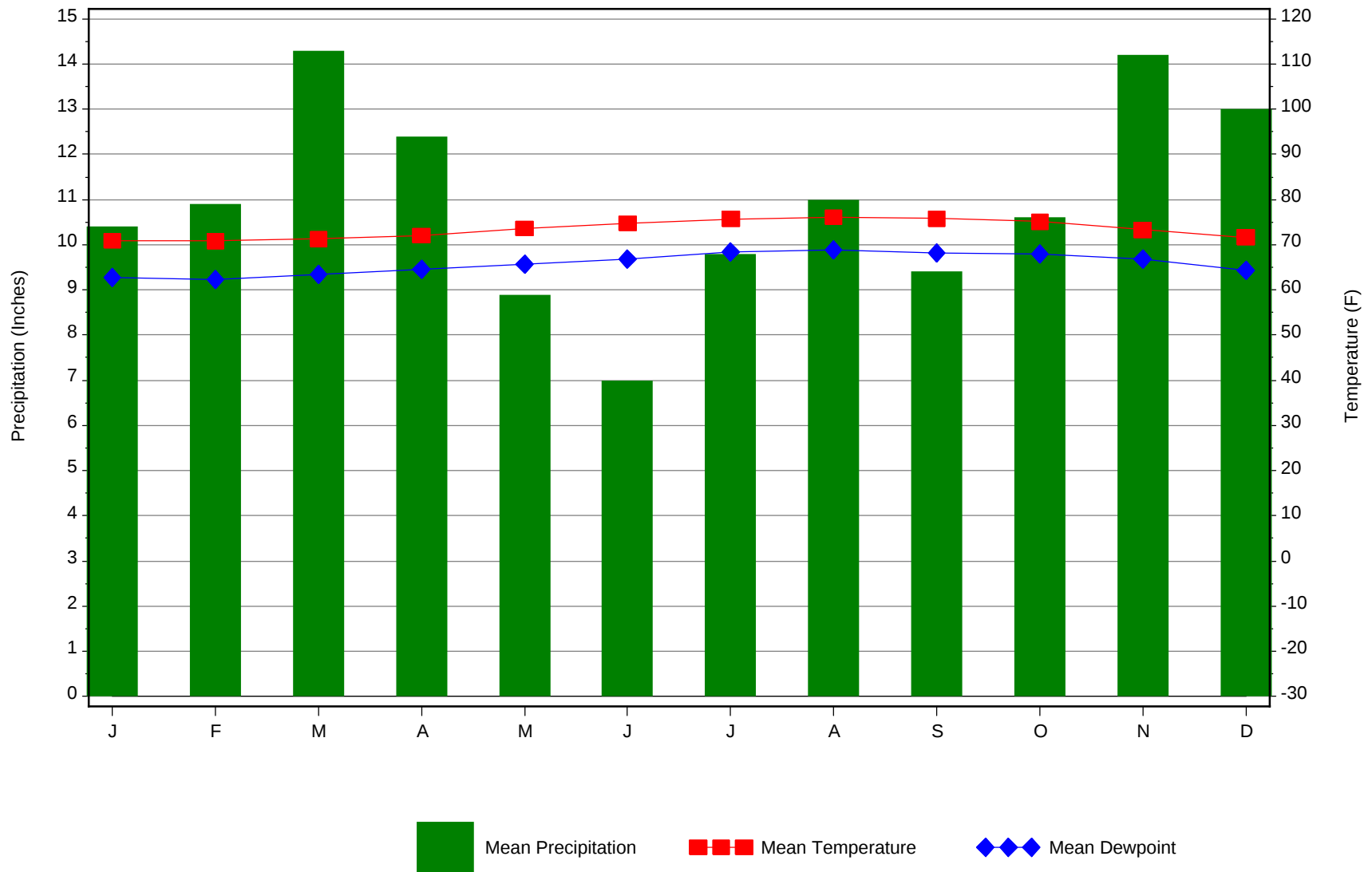
Other Site Data

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
10	6.8	105	9.2 + 1.2
Ground Water Temperature (°F) 50 Foot Depth*	Frost Depth 50 Year Recurrence (in)	Ground Snow Load 50 Year Recurrence (lb/ft ²)	Average Annual Freeze-Thaw Cycles (#)
75.9	0	0	0

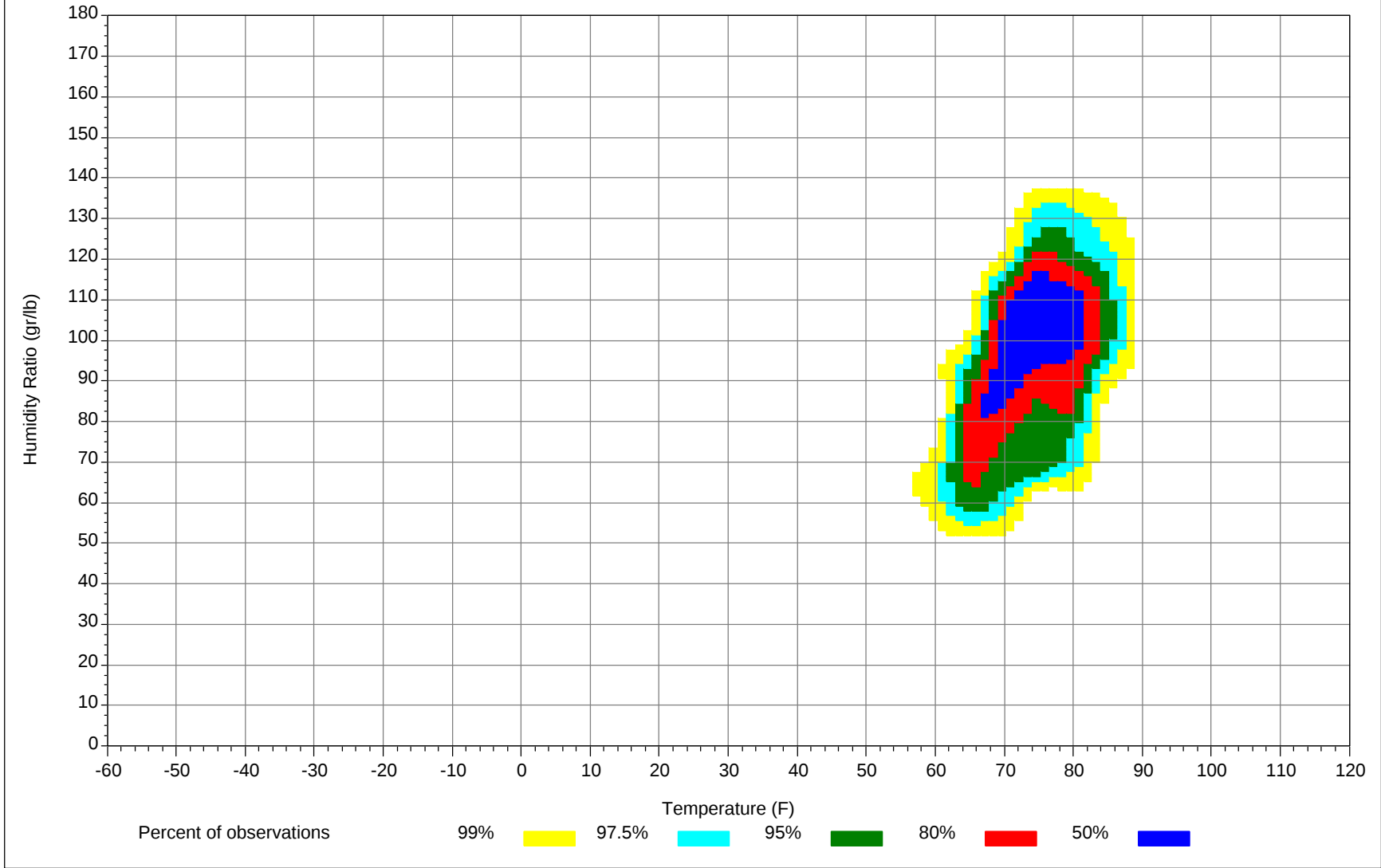
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.



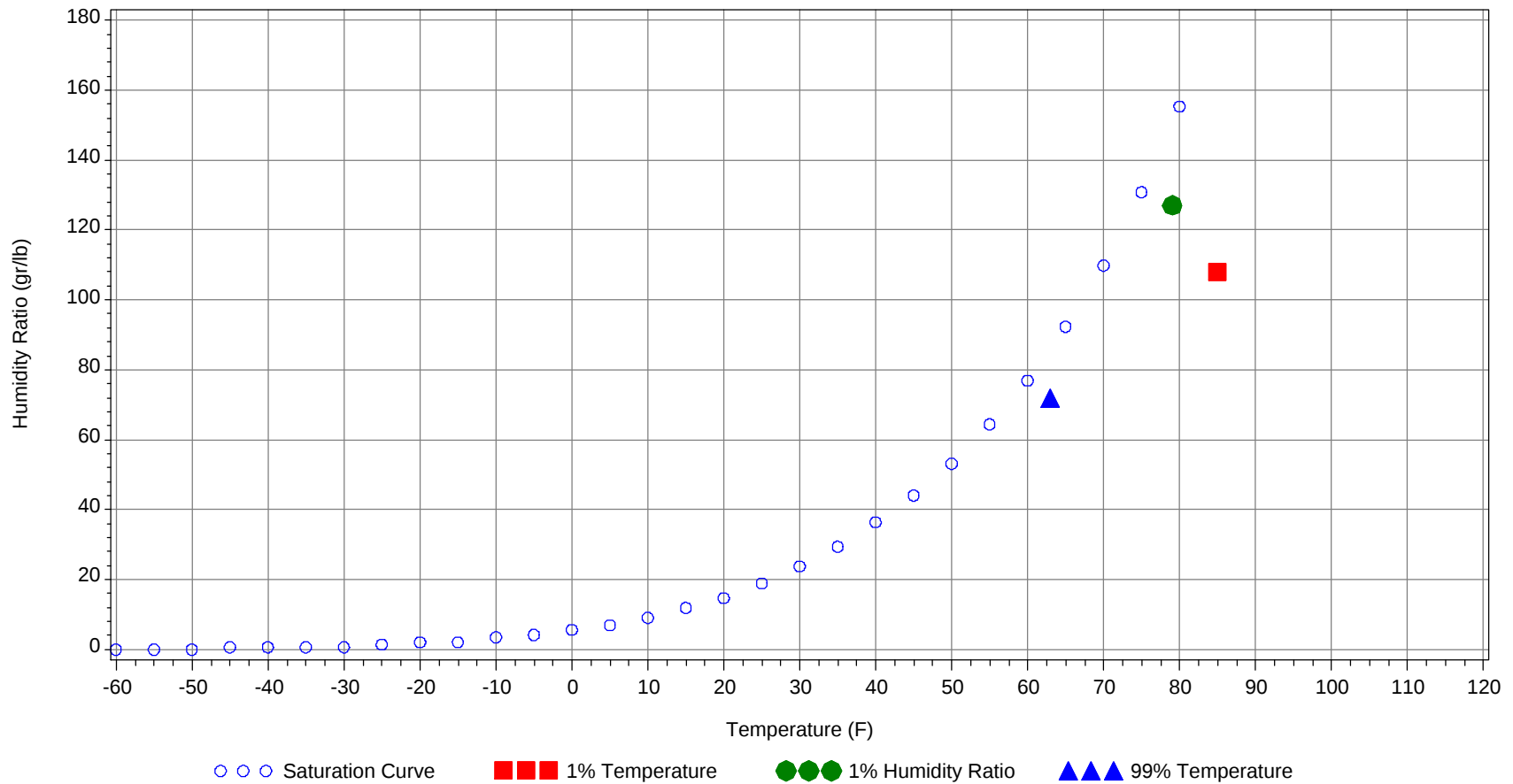
Average Annual Climate



Long Term Psychrometric Summary



Psychrometric Summary of Peak Design Values



	(° F) / (gr/lb)	MCDB (° F)	MCWB (° F)	MCDP (° F)	MCHR (gr/lb)	Enthalpy (btu/lb)
1.0% Dry Bulb	85.0		74		108.0	38.0
99.0% Dry Bulb	63.0				72.0	25.6
1.0% Humidity Ratio	127.0	79.0	75.4	73.9		38.8

Dry-Bulb Temperature Hours For An Average Year

	January					February					March				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
90/ 94		0		0	70.5		0		0	69.5					
85/ 89		1		1	70.4		2	0	2	70.7		2		2	72.4
80/ 84		46	2	48	70.2		40	1	41	70.4		47	1	48	70.4
75/ 79	0	120	29	149	68.5	0	101	27	128	68.2	1	120	34	155	68.7
70/ 74	36	70	126	232	66.9	35	67	113	215	66.4	55	69	136	260	66.9
65/ 69	129	10	77	216	63.9	111	12	71	194	63.8	135	10	71	216	64.4
60/ 64	82	1	14	97	59.5	76	1	11	88	59.6	56	0	6	62	60.3
55/ 59	1		0	1	54.5	2		0	2	54.1	0		0	0	54.5
50/ 54													0	0	54

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

	April					May					June				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
90/ 94							0		0	63					
85/ 89		0		0	71.2		4		4	73.1		4		4	73.6
80/ 84	0	55	1	56	70.7	1	98	6	105	71.5	1	131	15	147	71.9
75/ 79	4	122	41	167	69.1	13	113	70	196	69.8	16	88	86	190	70.6
70/ 74	70	57	142	269	67.4	111	32	146	289	67.9	154	17	133	304	68.5
65/ 69	133	6	52	191	64.9	112	1	26	139	64.9	66	0	6	72	65.2
60/ 64	34	0	4	38	61.1	11		0	11	60.4	3			3	60.5
55/ 59	0			0	56.3	0			0	55					
50/ 54															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

	July					August					September				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
90/ 94		0		0	74		0		0	76		0		0	77.8
85/ 89		12	0	12	75.3		19	0	19	75.8		25	0	25	75.1
80/ 84	2	151	28	181	72.9	2	156	31	189	73.3	2	147	26	175	73.1
75/ 79	28	71	110	209	71.7	34	64	117	215	72.2	28	57	99	184	72
70/ 74	180	14	107	301	69.2	186	10	98	294	69.3	168	11	112	291	68.8
65/ 69	36	0	3	39	64.8	26		1	27	64.3	41		3	44	64.4
60/ 64	2			2	60.7	0			0	58.8	1			1	60
55/ 59															
50/ 54															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

	October					November					December				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
90/ 94		0		0	75.7		0		0	75.3					
85/ 89		16	0	16	74.8		3		3	74.1		1		1	72.8
80/ 84	1	141	13	155	73.1	0	82	2	84	72.7		48	1	49	71
75/ 79	19	74	92	185	71.9	8	115	56	179	71	1	128	30	159	69.4
70/ 74	174	17	138	329	68.9	131	40	157	328	68.8	68	65	146	279	67.8
65/ 69	51	0	5	56	64.3	87	1	23	111	64.6	133	6	65	204	64.5
60/ 64	3		0	3	59.8	15		1	16	60.2	45	0	6	51	59.6
55/ 59											1			1	54.8
50/ 54															

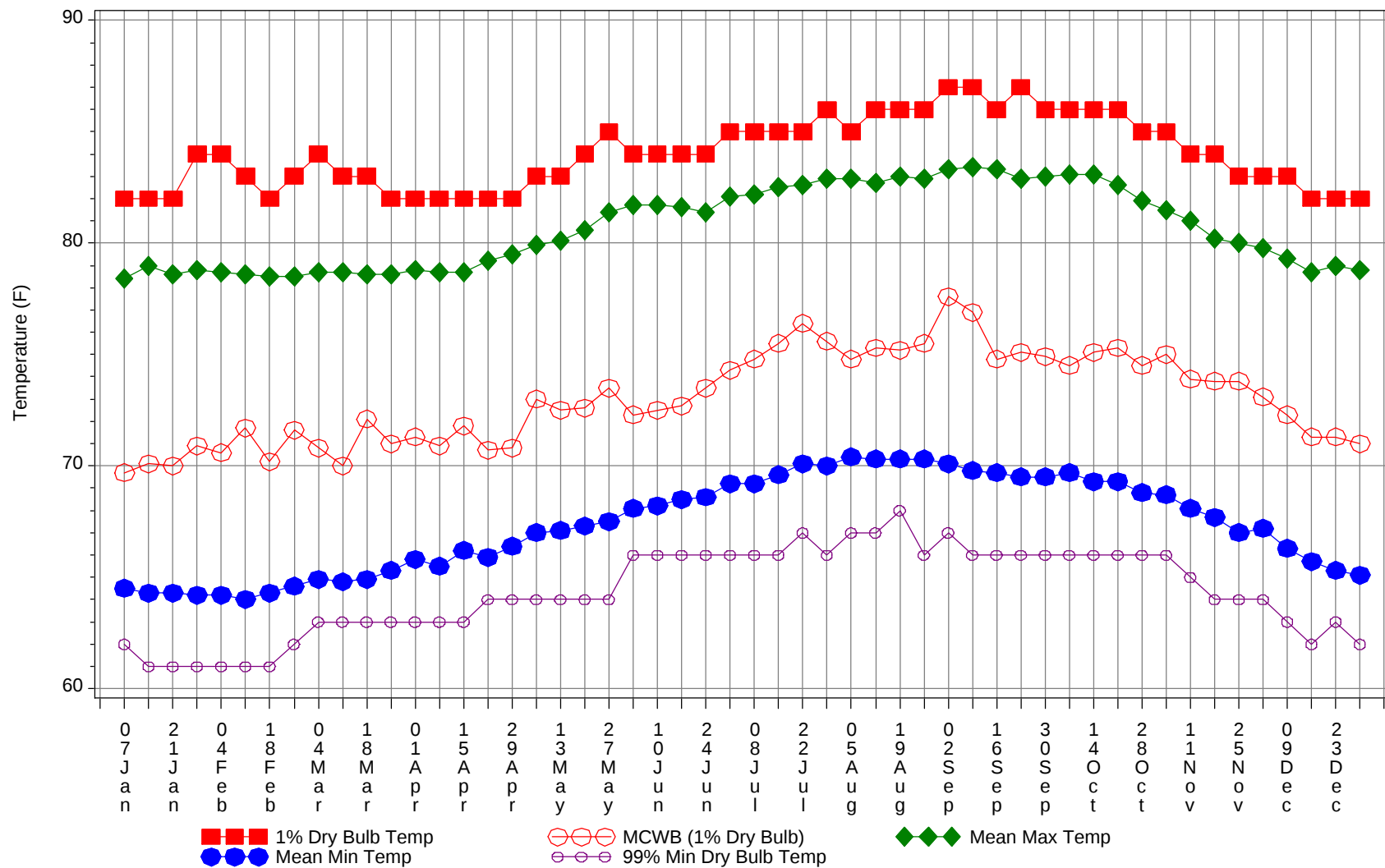
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

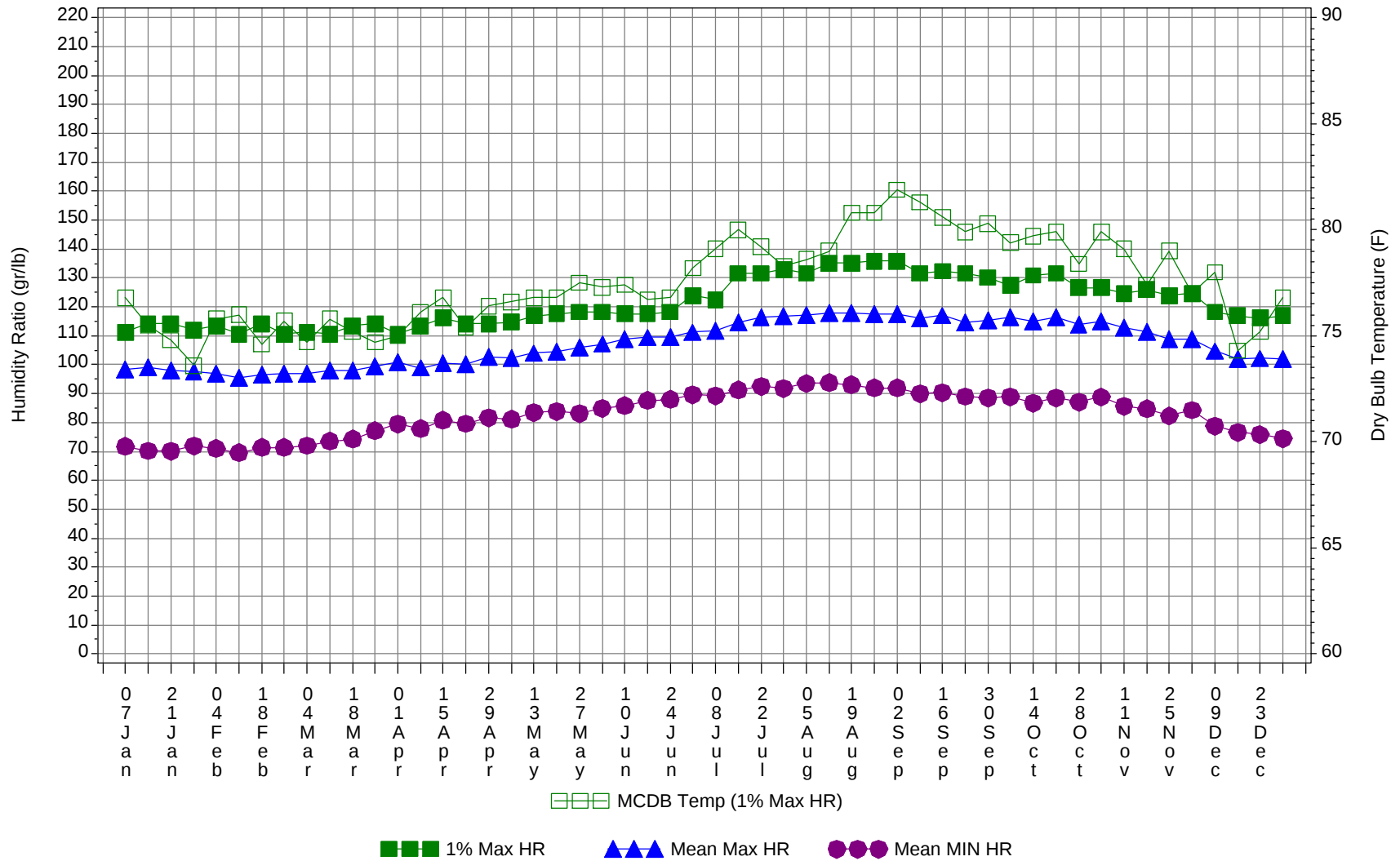
	Annual				
Temperature Range (° F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (° F)
90/ 94		1		1	73.8
85/ 89		88	1	89	74.8
80/ 84	8	1140	128	1276	72.3
75/ 79	151	1174	792	2117	70.4
70/ 74	1369	468	1552	3389	68.2
65/ 69	1059	46	404	1509	64.4
60/ 64	329	2	43	374	59.9
55/ 59	5		0	5	54.4
50/ 54			0	0	54

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Annual Summary of Temperatures



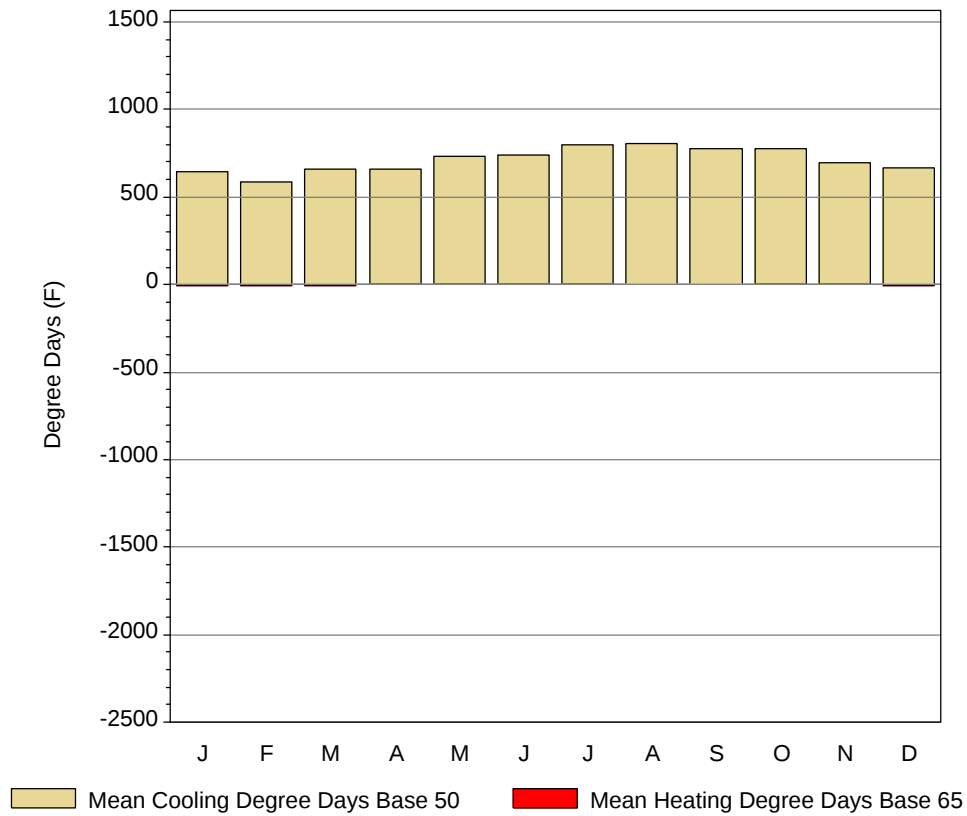
Long Term Humidity and Dry Bulb Temperature Summary



Long Term Humidity and Dry Bulb Temperature Summary

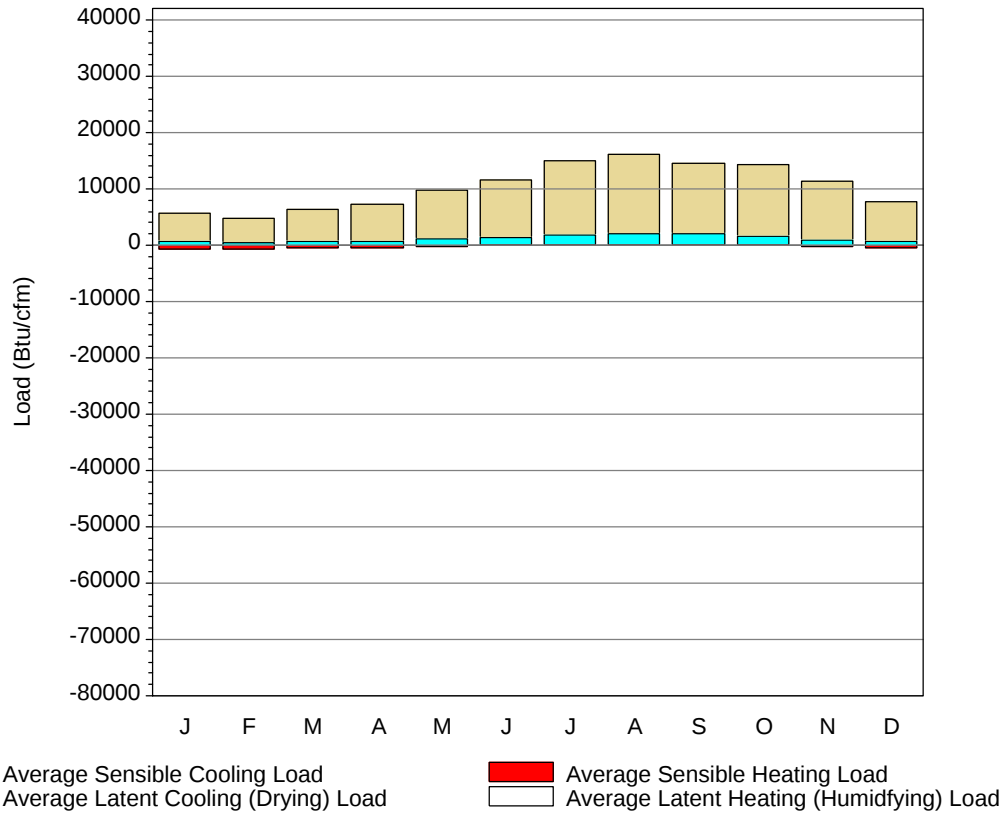
Week Ending	1.0% Temp (° F)	MCWB@ 1% Temp (° F)	Mean Max Temp (° F)	Mean Min Temp (° F)	99% Temp (° F)	1.0% HR (gr/lb)	MCDB@ 1% HR (° F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	82	69.7	78.4	64.5	62	111.3	76.8	98.4	71.8
14-Jan	82	70.1	79	64.3	61	114.1	75.5	99.2	70.2
21-Jan	82	70	78.6	64.3	61	114.1	74.8	98	70.1
28-Jan	84	70.9	78.8	64.2	61	112	73.6	97.8	71.9
4-Feb	84	70.6	78.7	64.2	61	113.4	75.8	96.8	71
11-Feb	83	71.7	78.6	64	61	110.6	76	95.6	69.5
18-Feb	82	70.2	78.5	64.3	61	114.1	74.6	96.6	71.4
25-Feb	83	71.6	78.5	64.6	62	110.6	75.7	97	71.3
4-Mar	84	70.8	78.7	64.9	63	111.3	74.7	96.8	72
11-Mar	83	70	78.7	64.8	63	110.6	75.8	98.1	73.6
18-Mar	83	72.1	78.6	64.9	63	113.4	75.2	97.9	74.2
25-Mar	82	71	78.6	65.3	63	114.1	74.7	99.6	77.2
1-Apr	82	71.3	78.8	65.8	63	110.6	75	100.8	79.5
8-Apr	82	70.9	78.7	65.5	63	113.4	76.1	98.9	77.9
15-Apr	82	71.8	78.7	66.2	63	116.2	76.8	100.5	80.7
22-Apr	82	70.7	79.2	65.9	64	114.1	75.4	100.3	79.6
29-Apr	82	70.8	79.5	66.4	64	114.1	76.4	102.6	81.7
6-May	83	73	79.9	67	64	114.8	76.6	102.3	81.1
13-May	83	72.5	80.1	67.1	64	116.9	76.8	104	83.4
20-May	84	72.6	80.6	67.3	64	117.6	76.8	104.6	83.8
27-May	85	73.5	81.4	67.5	64	118.3	77.5	106	83.1
4-Jun	84	72.3	81.7	68.1	66	118.3	77.3	107.2	84.9
10-Jun	84	72.5	81.7	68.2	66	117.6	77.4	109	85.8
17-Jun	84	72.7	81.6	68.5	66	117.6	76.7	109.4	87.6
24-Jun	84	73.5	81.4	68.6	66	118.3	76.8	109.7	88
1-Jul	85	74.3	82.1	69.2	66	123.9	78.2	111.2	89.6
8-Jul	85	74.8	82.2	69.2	66	122.5	79.1	111.8	89.2
15-Jul	85	75.5	82.5	69.6	66	131.6	80	114.6	91.3
22-Jul	85	76.4	82.6	70.1	67	131.6	79.2	116.5	92.5
29-Jul	86	75.6	82.9	70	66	133	78.3	116.8	91.8
5-Aug	85	74.8	82.9	70.4	67	131.6	78.6	117.1	93.5
12-Aug	86	75.3	82.7	70.3	67	135.1	79	118	93.8
19-Aug	86	75.2	83	70.3	68	135.1	80.8	117.8	93.1
26-Aug	86	75.5	82.9	70.3	66	135.8	80.8	117.4	91.9
2-Sep	87	77.6	83.3	70.1	67	135.8	81.9	117.6	91.9
9-Sep	87	76.9	83.4	69.8	66	131.6	81.3	116.1	89.9
16-Sep	86	74.8	83.3	69.7	66	132.3	80.6	117	90.4
23-Sep	87	75.1	82.9	69.5	66	131.6	79.9	114.7	89
30-Sep	86	74.9	83	69.5	66	130.2	80.3	115.5	88.5
7-Oct	86	74.5	83.1	69.7	66	127.4	79.4	116.5	88.9
14-Oct	86	75.1	83.1	69.3	66	130.9	79.7	115	86.8
21-Oct	86	75.3	82.6	69.3	66	131.6	79.9	116.4	88.6
28-Oct	85	74.5	81.9	68.8	66	126.7	78.4	114	87.1
4-Nov	85	75	81.5	68.7	66	126.7	79.9	115	88.8
11-Nov	84	73.9	81	68.1	65	124.6	79.1	112.7	85.6
18-Nov	84	73.8	80.2	67.7	64	126	77.4	111.3	84.8
25-Nov	83	73.8	80	67	64	123.9	79	109	82.3
2-Dec	83	73.1	79.8	67.2	64	124.6	77	109	84.3
9-Dec	83	72.3	79.3	66.3	63	118.3	78	104.7	78.7
16-Dec	82	71.3	78.7	65.7	62	116.9	74.3	102.1	76.6
23-Dec	82	71.3	79	65.3	63	116.2	75.2	102.2	75.8
31-Dec	82	71	78.8	65.1	62	116.9	76.8	102	74.5

Degree Days, Heating and Cooling (Base 65 F) & Cooling (Base 50F)



Month	Mean Cooling Degree Days (°F) Base 50	Mean Cooling Degree Days (°F) Base 65	Mean Heating Degree Days (°F) Base 65
JAN	646.4	188.3	6.9
FEB	587.3	169.8	6.6
MAR	661.4	200	3.6
APR	659.2	210.9	1.7
MAY	729.7	265.2	0.5
JUN	740.8	290.9	0.1
JUL	796.5	331.6	0.1
AUG	809.5	344.5	0
SEP	774.5	324.5	0
OCT	777.2	312.3	0.1
NOV	699.6	250.3	0.7
DEC	668.4	206.9	3.3
ANN	8550.5	3095.2	23.6

Average Ventilation and Infiltration Loads (Outside Air vs 75F, 60% RH summer; 68F, 30% RH winter)



Month	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	632	-764	5059	0
FEB	569	-704	4321	0
MAR	648	-541	5692	0
APR	715	-356	6580	0
MAY	1175	-161	8545	0
JUN	1480	-50	10235	0
JUL	1888	-31	13127	0
AUG	2061	-15	14195	0
SEP	1977	-31	12653	0
OCT	1697	-48	12619	0
NOV	976	-163	10478	0
DEC	652	-458	7121	0
ANN	14470	-3322	110625	0

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	HILO, HI 21504	Window:	1.000
Lat, Lon, Elev	19.72N 155.07W 36ft	Overhang:	1.128
Press, Stn_Type	14.7psia Secondary	Vert Gap:	0.200

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day) Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Global	1190	1350	1450	1520	1630	1710	1650	1680	1590	1380	1170	1110	1450
	Std.Dev.	125	151	162	124	134	105	137	119	134	128	126	115	56
	Minimum	890	1090	1120	1330	1320	1470	1400	1390	1340	1160	920	880	1340
	Maximum	1460	1620	1730	1770	1830	1880	2020	1970	1800	1720	1410	1330	1590
	Diffuse	490	570	710	800	800	790	790	730	680	630	560	490	670
Clear Day	Global	1720	1980	2280	2500	2580	2590	2580	2510	2330	2050	1760	1620	2210
NORTH	Global	320	360	410	460	570	680	620	490	410	380	330	310	440
	Diffuse	320	360	410	440	480	510	490	440	410	380	330	310	410
Clear Day	Global	290	310	350	430	710	970	850	510	350	320	290	270	470
EAST	Global	710	780	800	820	850	860	820	860	860	780	670	650	790
	Diffuse	390	430	490	540	550	550	540	530	510	470	400	370	480
Clear Day	Global	1040	1170	1310	1390	1400	1390	1380	1380	1320	1210	1070	1000	1250
SOUTH	Global	1190	1080	810	580	460	450	440	510	730	950	1050	1160	780
	Diffuse	480	500	500	480	450	450	440	450	480	510	490	470	470
Clear Day	Global	1980	1740	1270	680	390	380	380	520	1010	1580	1910	2020	1150
WEST	Global	650	720	760	770	820	870	850	880	840	730	640	610	760
	Diffuse	390	430	500	540	550	560	550	540	510	460	410	380	480
Clear Day	Global	1040	1170	1310	1390	1400	1390	1380	1380	1320	1210	1070	1000	1250

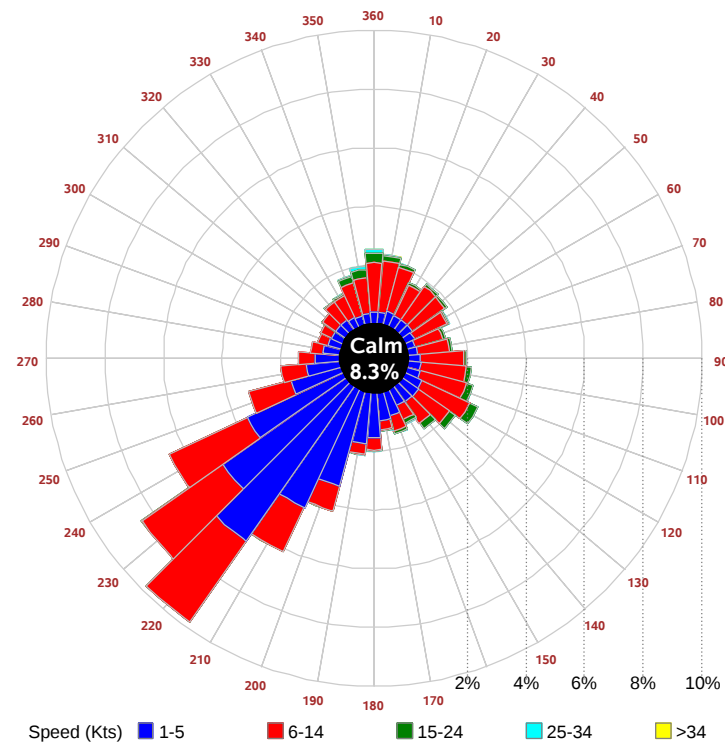
Average Annual Solar Radiation - Nearest Available Site Source: National Renewable Energy Laboratory, Golden CO, 1995

AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Unshaded	840	970	1050	1100	1190	1240	1200	1230	1160	990	830	780	1050
NORTH	Unshaded	220	250	280	310	350	410	380	320	280	260	230	210	290
	Shaded	160	180	200	220	240	260	250	230	210	190	170	150	200
EAST	Unshaded	490	550	570	580	600	600	580	610	610	550	470	460	560
	Shaded	300	330	330	330	340	340	330	350	350	320	280	280	320
SOUTH	Unshaded	850	730	510	360	310	310	310	320	430	620	740	840	530
	Shaded	270	230	230	230	230	230	220	230	240	230	240	290	240
WEST	Unshaded	450	500	530	540	580	610	600	630	590	510	440	430	540
	Shaded	270	300	310	310	330	340	340	350	340	300	260	250	310

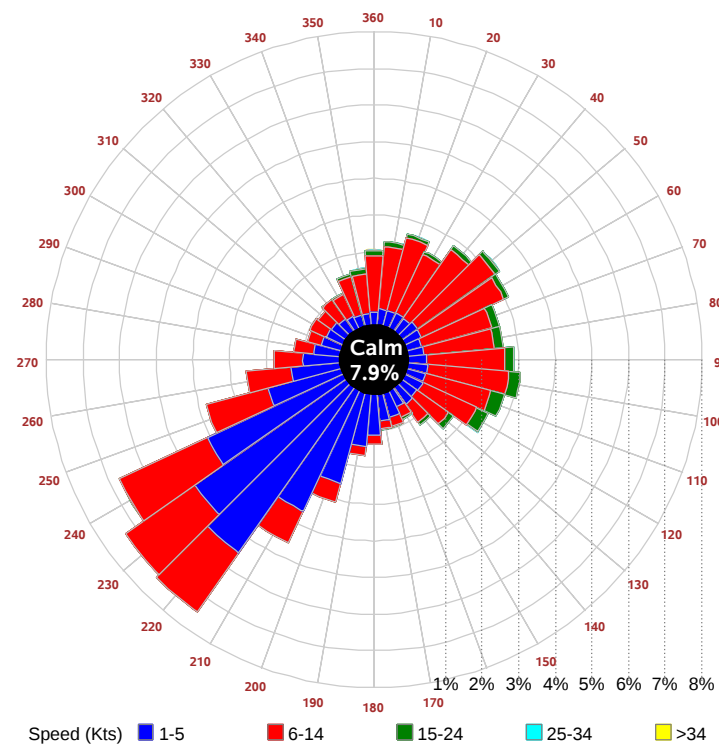
AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS Percentage Uncertainty = 9												
		March					June					
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	43	84	100	83	41	57	91	104	87	49	
	M.Cloudy	26	51	65	53	24	37	61	75	62	32	
NORTH	M.Clear	11	15	16	16	11	30	25	21	26	30	
	M.Cloudy	11	16	19	18	10	20	22	21	24	19	
EAST	M.Clear	80	65	17	16	11	78	58	15	16	12	
	M.Cloudy	31	36	19	18	10	39	40	17	18	12	
SOUTH	M.Clear	27	48	56	48	26	13	16	15	16	12	
	M.Cloudy	15	29	38	31	14	13	17	17	18	12	
WEST	M.Clear	11	15	17	65	75	13	16	19	64	76	
	M.Cloudy	11	16	19	38	28	13	17	20	45	36	
M.Clear	(% hrs)	23	26	25	21	18	17	21	22	20	16	

		Sept					Dec					
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	51	90	101	82	39	32	68	78	60	20	
	M.Cloudy	32	58	71	56	25	19	40	52	39	13	
NORTH	M.Clear	12	16	16	16	11	9	14	15	13	7	
	M.Cloudy	12	17	18	17	10	8	14	17	14	6	
EAST	M.Clear	81	61	16	16	11	64	53	15	13	7	
	M.Cloudy	37	39	18	17	10	23	28	17	14	6	
SOUTH	M.Clear	23	41	46	37	17	48	76	82	69	34	
	M.Cloudy	16	29	36	29	12	19	37	47	36	12	
WEST	M.Clear	12	16	23	69	75	9	14	21	58	51	
	M.Cloudy	12	17	22	45	32	8	14	19	32	17	
M.Clear	(% hrs)	27	29	28	26	21	33	35	35	30	24	

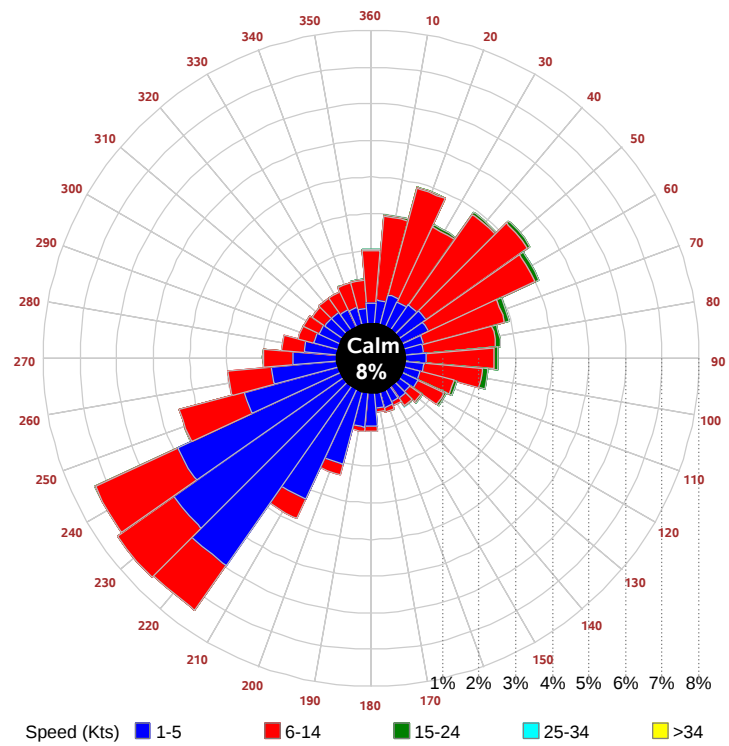
Wind Summary - December, January, and February



Wind Summary - March, April, and May



Wind Summary - June, July, and August



Wind Summary - September, October, and November

