

KANEOHE/OAHU HI

Latitude = 21.45 N

Longitude = 157.70 W

Period of Record = 1973 to 1996

WMO No. 911760

Elevation = 10 feet

Average Pressure = 29.97 inches Hg

Design Criteria Data

	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(°F)				
Median of Extreme Highs	88	76	117	10.0	E
0.4% Occurrence	86	75	113	10.1	ENE
1.0% Occurrence	85	74	111	10.1	ENE
2.0% Occurrence	84	74	110	10.2	ENE
Mean Daily Range	8	-	-	-	-
97.5% Occurrence	69	65	84	7.8	ENE
99.0% Occurrence	67	63	81	7.7	N
99.6% Occurrence	66	63	79	7.3	N
Median of Extreme Lows	63	61	77	5.4	NE
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T_{wb})	(°F)				
Median of Extreme Highs	80	84	144	7.9	ENE
0.4% Occurrence	78	83	133	8.5	E
1.0% Occurrence	77	82	128	8.6	ENE
2.0% Occurrence	76	82	123	8.7	ENE
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)	(gr/lb)				
Median of Extreme Highs	151	83	1.00	7.0	ENE
0.4% Occurrence	136	81	0.90	7.9	E
1.0% Occurrence	131	81	0.88	8.0	E
2.0% Occurrence	127	80	0.85	8.1	E
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		0	2037	1959	7406

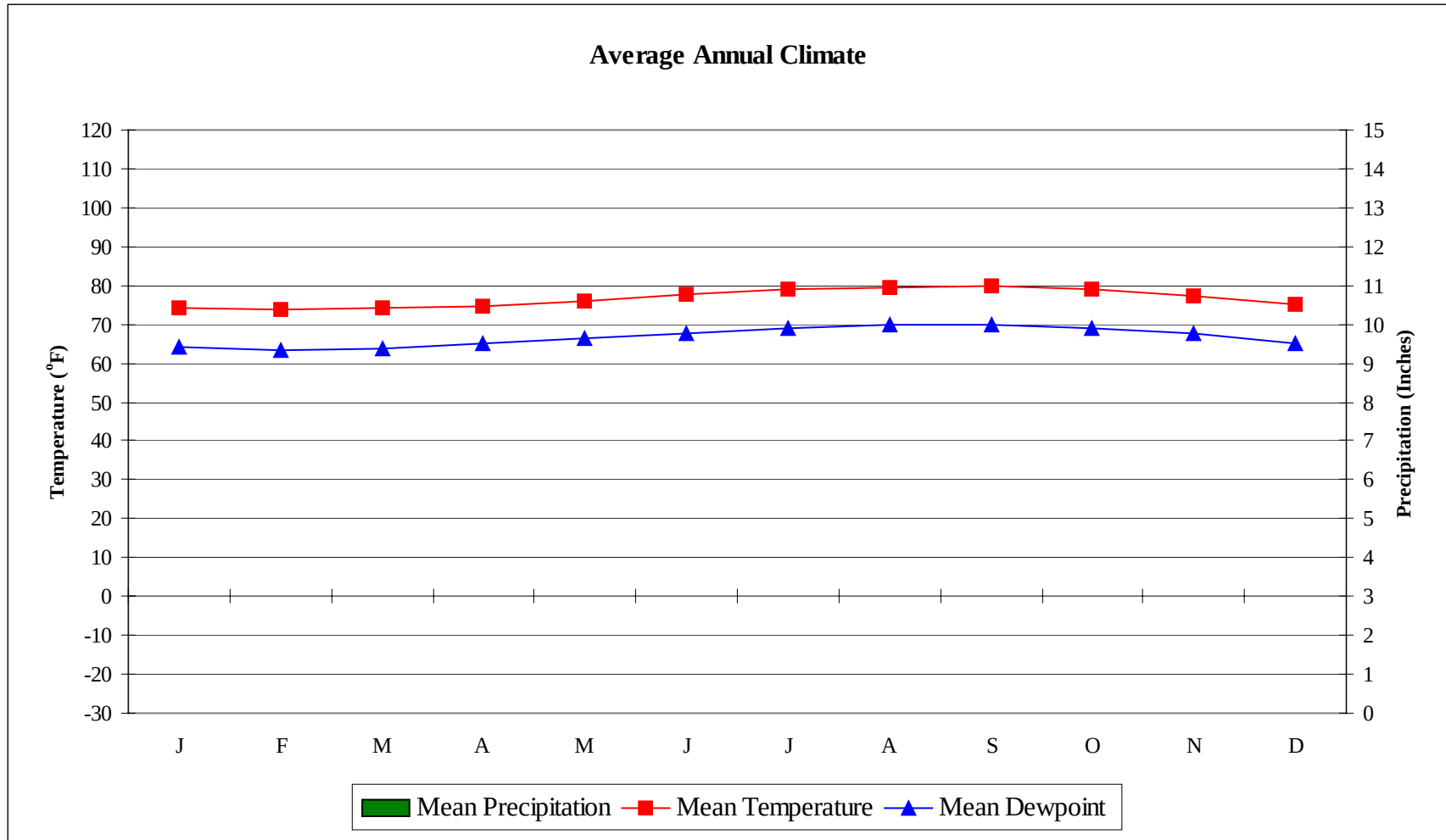
Other Site Data

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	4.0	105	9.7 + 2.0
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 (#)
79.2	0	0	0

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

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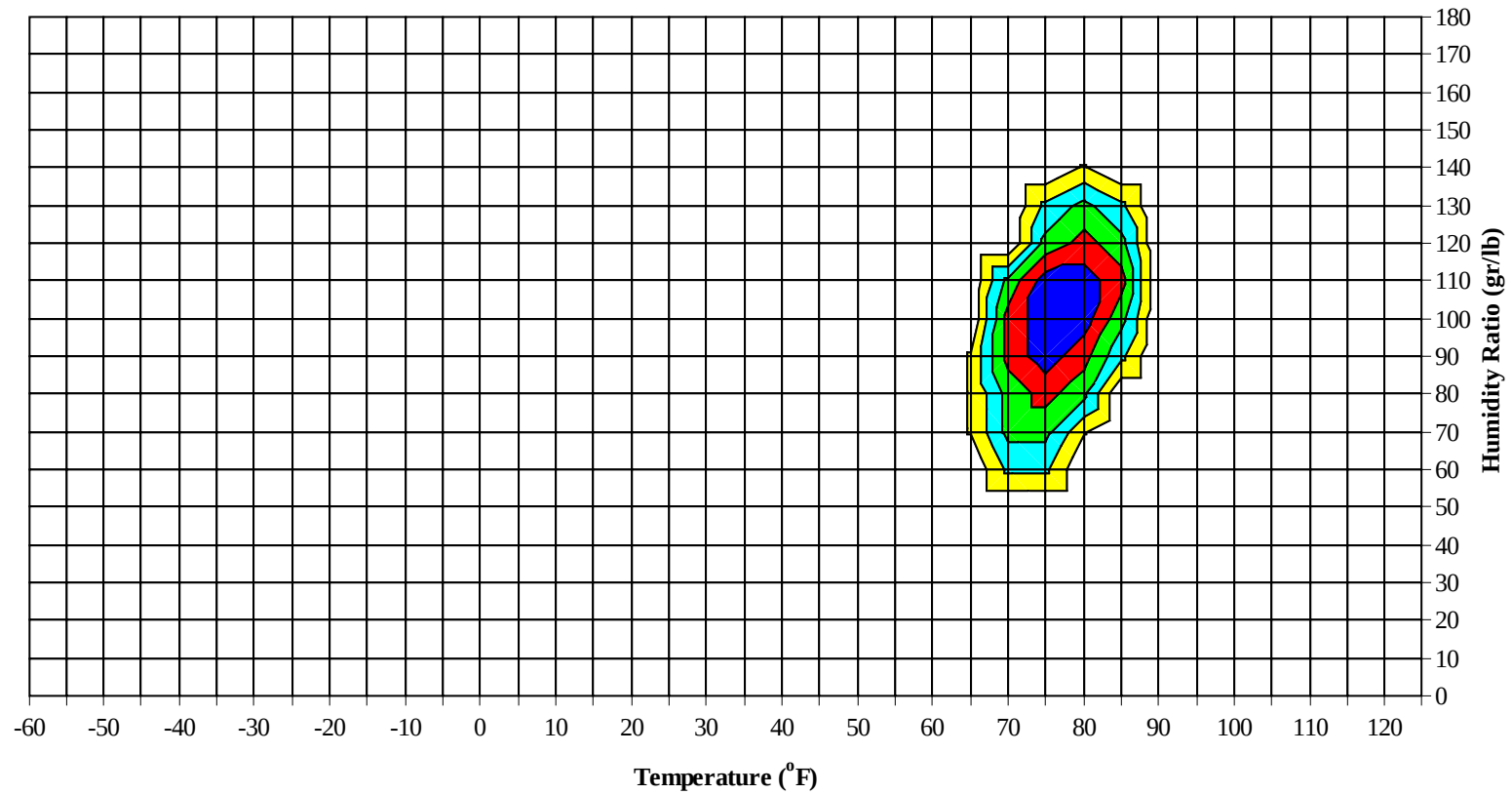


No Precipitation Data Available

KANEOHE/OAHU HI

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Long Term Psychrometric Summary

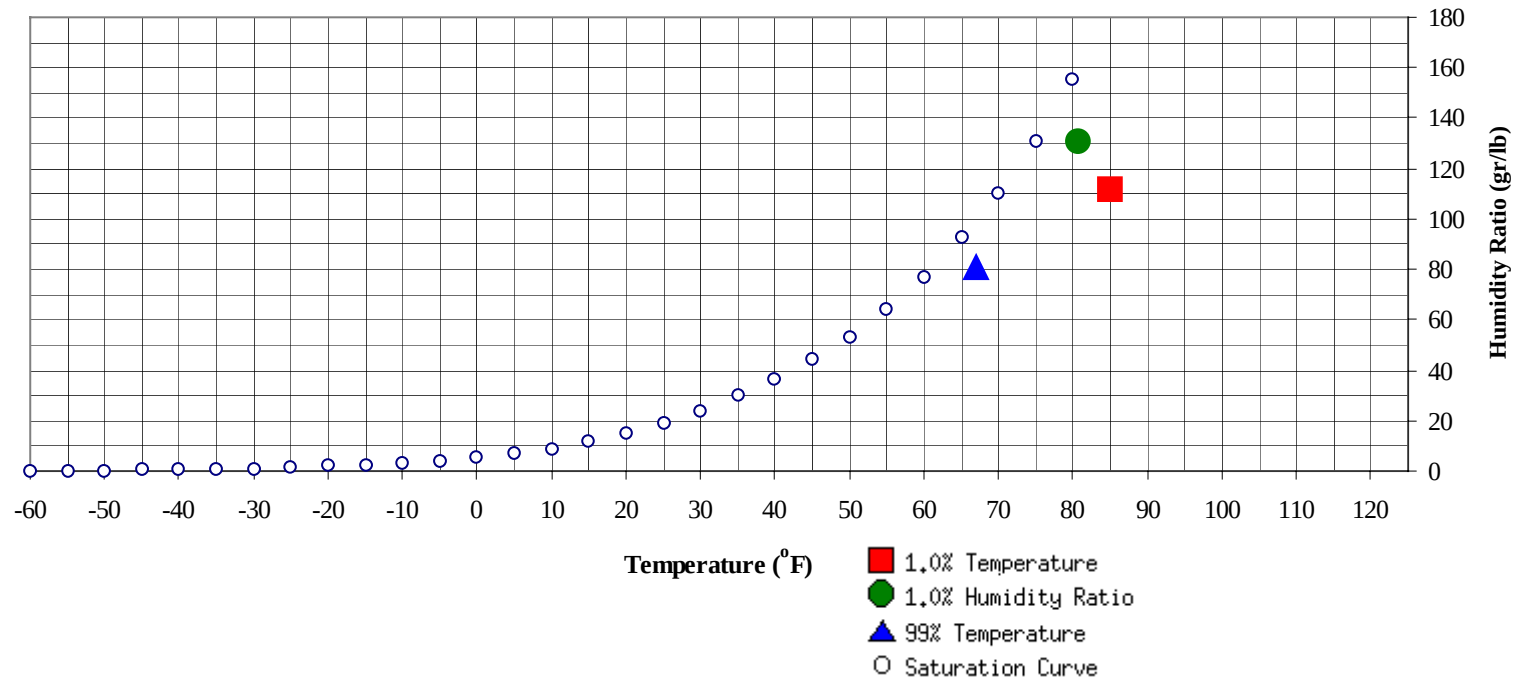


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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Psychrometric Summary of Peak Design Values



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
99% Dry Bulb	67	80.7	28.7		130.9	80.7	76.6	75	39.9

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	85	111.9	74.5	38.0

KANEOHE/OAHU HI

WMO No. 911760

Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	January					February					March				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
90 / 94															
85 / 89		1	0	1	73.5	0	1		1	72.4		1	0	1	72.4
80 / 84	0	36	4	40	71.4	0	34	2	36	70.8	0	49	3	52	70.5
75 / 79	42	151	91	284	69.1	28	122	72	223	68.7	38	135	89	263	68.8
70 / 74	157	56	137	351	66.4	147	58	127	331	66.3	168	58	135	361	66.6
65 / 69	46	4	15	65	63.9	47	9	22	78	62.7	38	5	20	63	64.0
60 / 64	2	0	1	3	60.8	2	0	1	3	60.6	3	0	1	4	61.4
55 / 59						0			0	59.0	0			0	59.0

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.

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WMO No. 911760

Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)

Period of Record = 1973 to 1996

[illegible]

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.

KANE OHE/OAHU HI

WMO No. 911760

Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)**Period of Record = 1973 to 1996**

Temperature Range (°F)	July					August					September				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
90 / 94							0		0	76.0			0		0 78.7
85 / 89		17	1	18	74.0	0	31	2	33	75.0	0	42	2	44	75.6
80 / 84	16	181	65	262	73.0	33	195	100	327	73.5	47	179	109	336	73.8
75 / 79	203	49	170	422	71.3	201	22	141	364	71.9	181	18	126	324	71.8
70 / 74	29	1	12	42	70.0	14	0	5	19	70.7	12	1	3	16	70.5
65 / 69	0	0	0	0	67.7		0	0	0		0		0	0	67.0
60 / 64															
55 / 59															

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.

KANEOHE/OAHU HI

WMO No. 911760

Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)**Period of Record = 1973 to 1996**

Temperature Range (°F)	October					November					December				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
90 / 94		0		0	79.5		0		0	78.0					
85 / 89	0	24	1	25	75.1		6		6	73.9		1	0	1	73.5
80 / 84	26	180	72	278	73.1	4	120	18	142	72.6	1	59	4	64	71.8
75 / 79	195	43	164	401	71.2	157	97	177	431	70.6	88	151	134	372	69.4
70 / 74	27	2	11	40	69.3	76	17	44	137	68.6	138	36	101	275	66.9
65 / 69	0	0	0	0	64.1	3	0	1	4	65.6	20	2	8	30	64.0
60 / 64						0	0		0		1		1	2	60.9
55 / 59											0		0	0	57.1

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.

WMO No. 911760

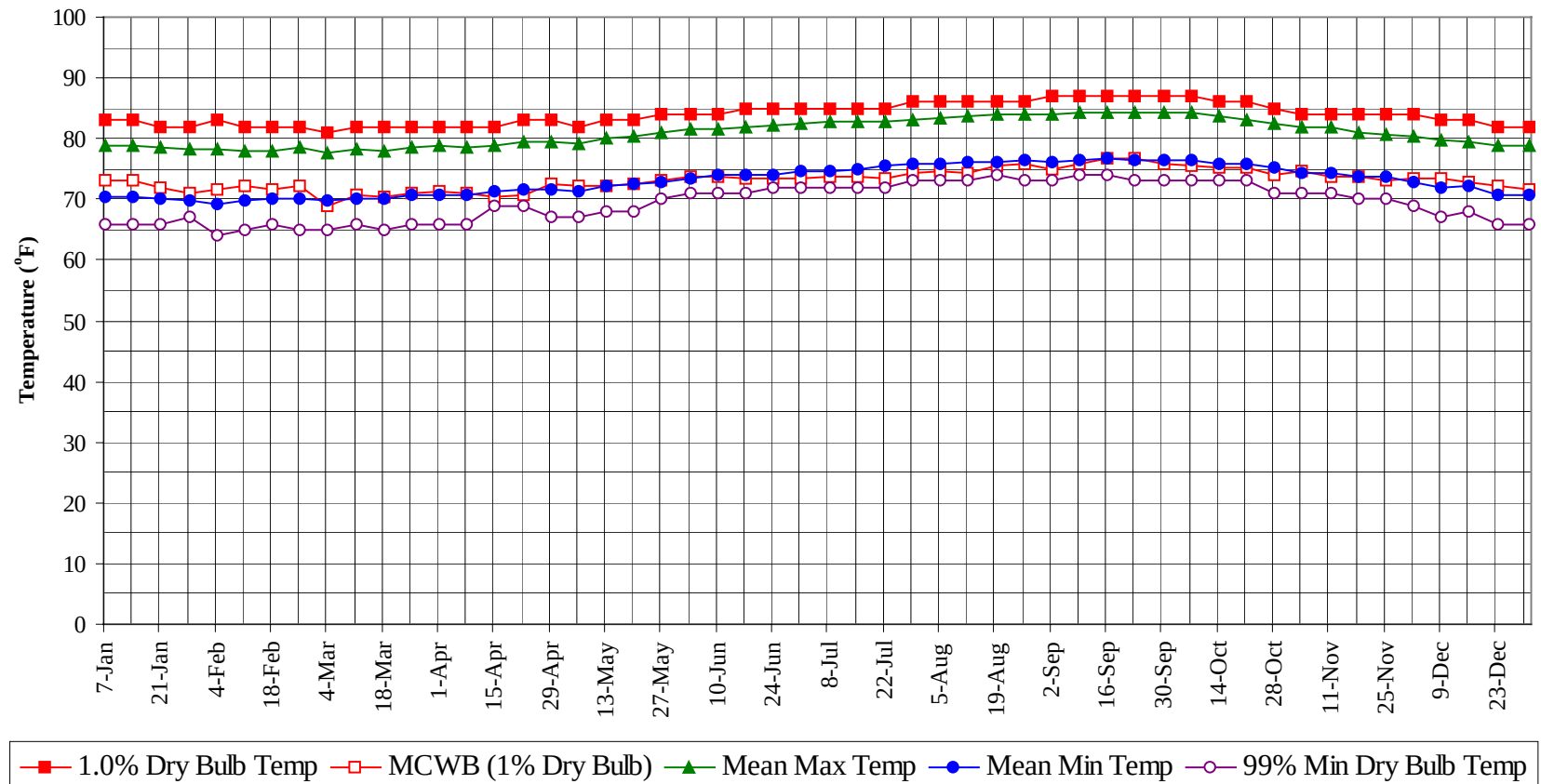
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

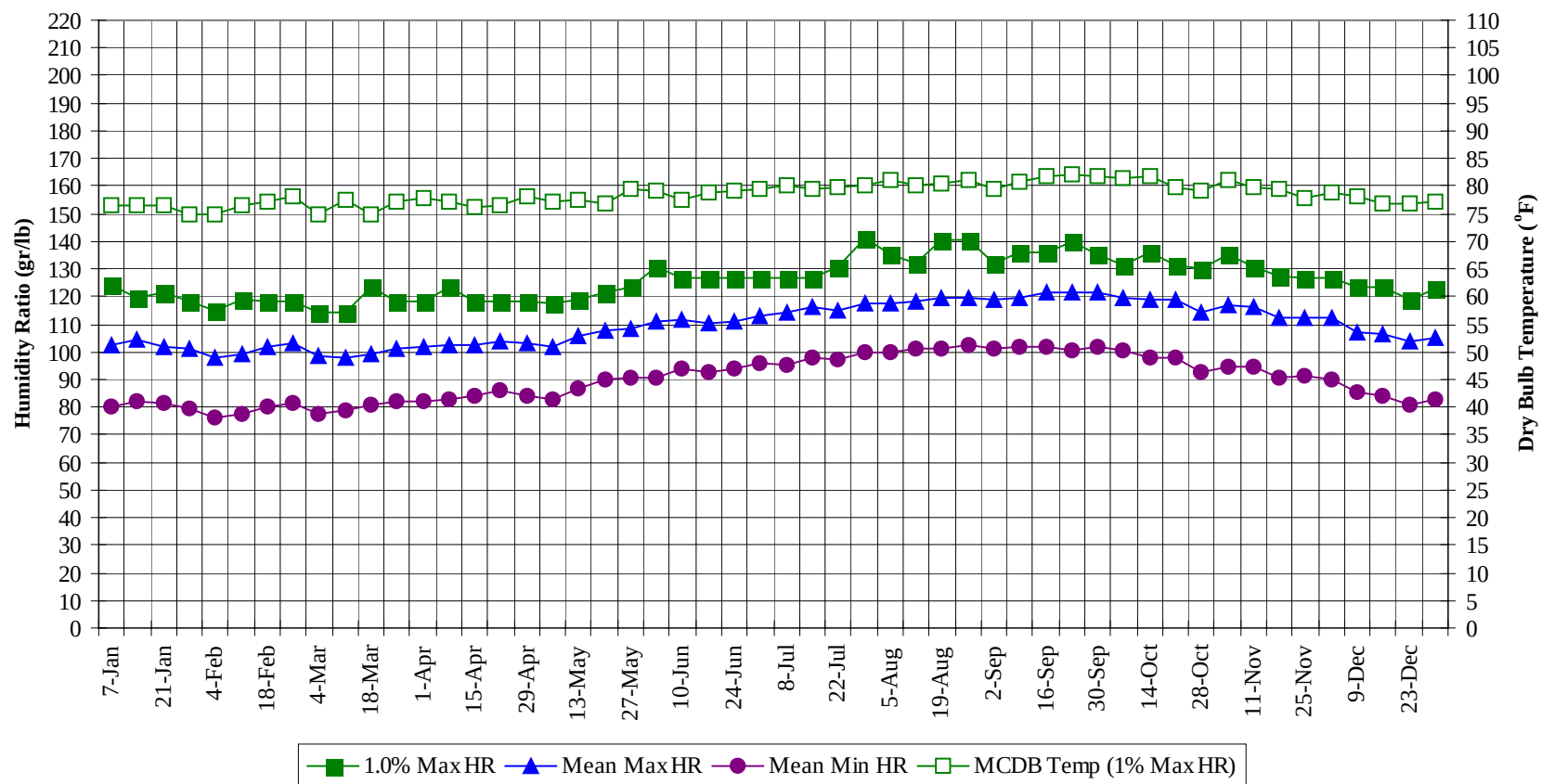
[illegible]

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

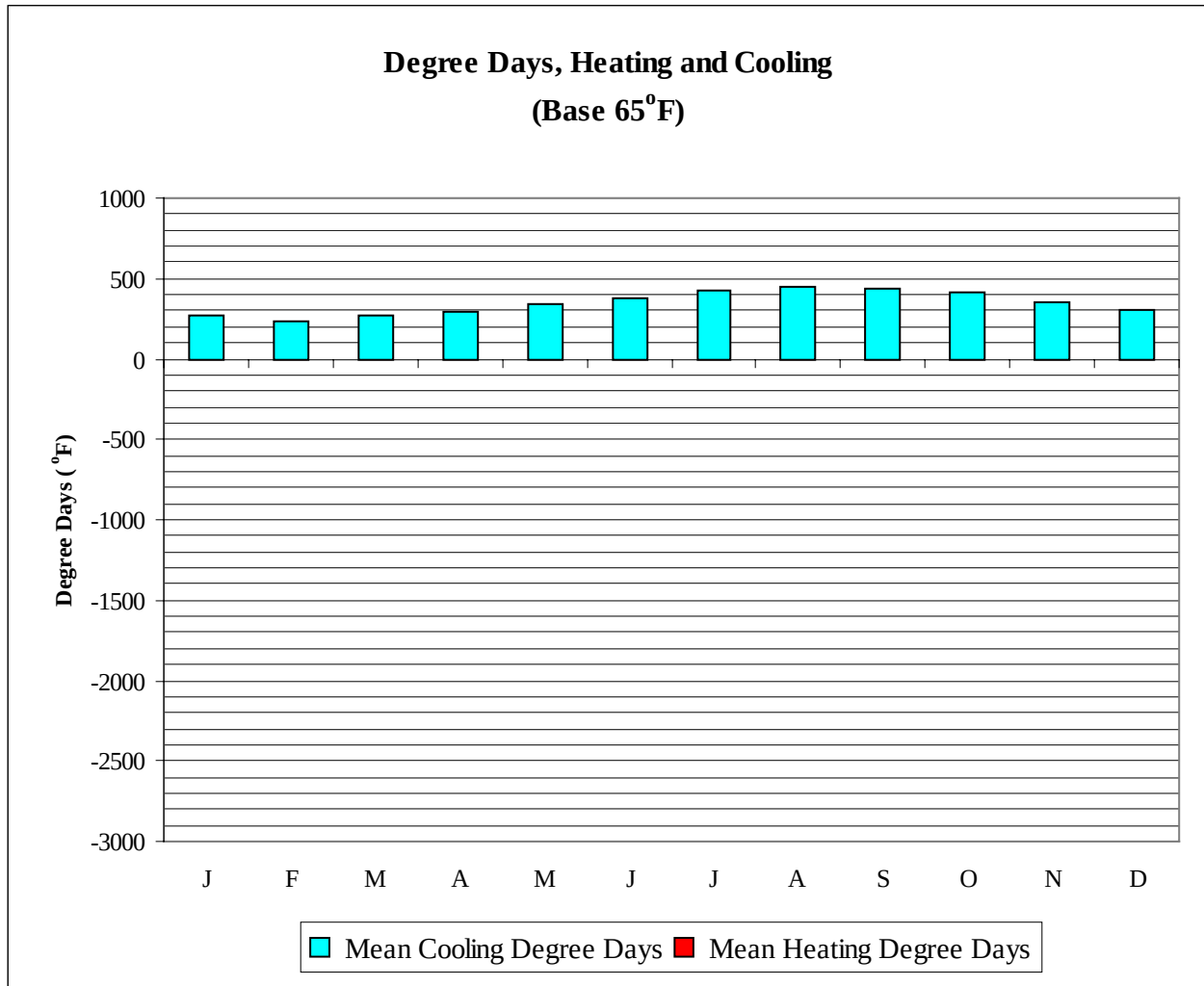


Long Term Humidity and Dry Bulb Temperature Summary



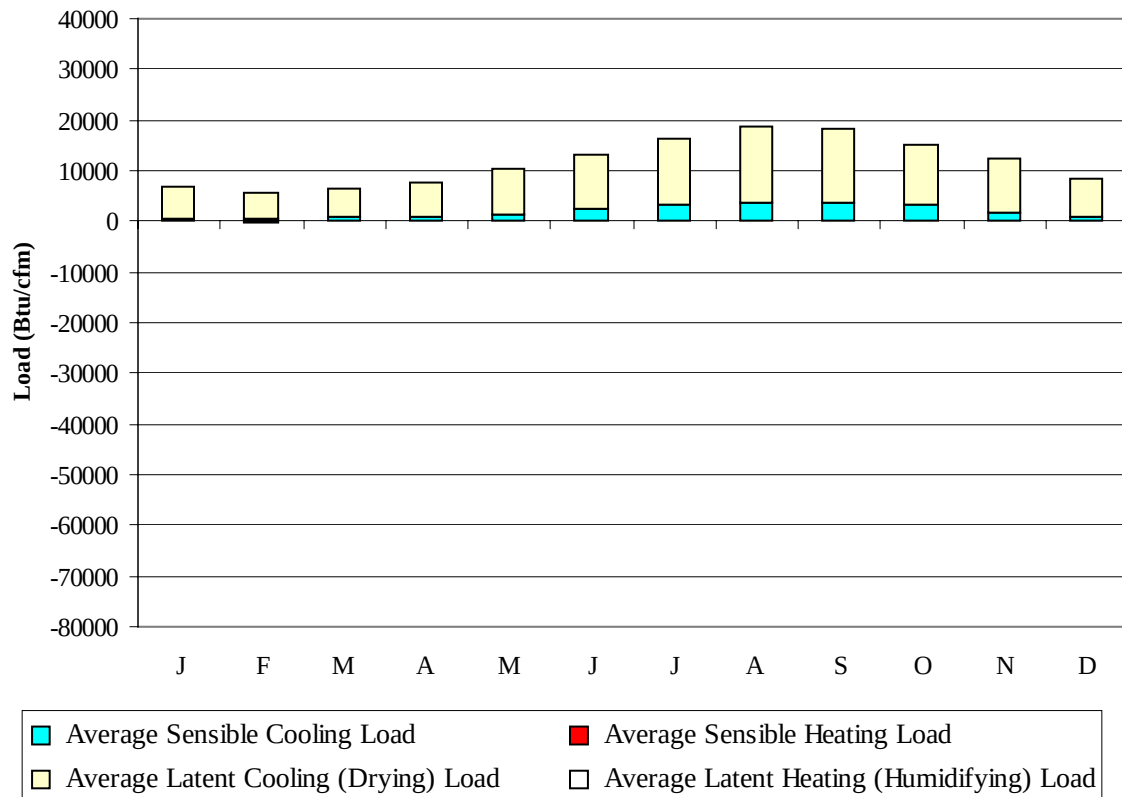
KANEOHE/OAHU HI**WMO No. 911760****Long Term Dry Bulb Temperature and Humidity Summary**

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	83.0	73.1	78.9	70.4	66.0	123.9	76.7	102.3	80.0
14-Jan	83.0	73.1	78.8	70.4	66.0	119.7	76.7	104.5	82.4
21-Jan	82.0	72.0	78.5	70.2	66.0	121.8	76.6	101.7	81.2
28-Jan	82.0	71.1	78.2	69.8	67.0	118.3	74.9	101.4	79.7
4-Feb	83.0	71.6	78.3	69.1	64.0	114.8	74.9	98.1	76.4
11-Feb	82.0	72.1	77.8	69.8	65.0	119.0	76.6	99.3	77.4
18-Feb	82.0	71.7	78.0	70.2	66.0	118.3	77.3	101.8	80.3
25-Feb	82.0	72.1	78.5	70.1	65.0	118.3	78.3	102.8	81.6
4-Mar	81.0	69.0	77.8	69.7	65.0	114.1	74.8	98.5	77.4
11-Mar	82.0	70.8	78.4	70.2	66.0	114.1	77.4	98.1	79.1
18-Mar	82.0	70.4	77.9	70.1	65.0	123.2	74.8	99.3	80.6
25-Mar	82.0	71.0	78.7	70.7	66.0	118.3	77.1	101.1	81.8
1-Apr	82.0	71.3	78.7	70.7	66.0	118.3	77.8	102.0	82.0
8-Apr	82.0	70.9	78.7	70.7	66.0	123.2	77.2	102.2	82.8
15-Apr	82.0	70.4	78.8	71.3	69.0	118.3	76.0	102.3	84.3
22-Apr	83.0	70.7	79.4	71.5	69.0	118.3	76.7	103.8	85.8
29-Apr	83.0	72.4	79.3	71.5	67.0	118.3	78.3	102.9	84.0
6-May	82.0	72.2	79.3	71.4	67.0	117.6	77.2	101.8	83.0
13-May	83.0	72.1	80.1	72.1	68.0	119.0	77.6	105.6	86.8
20-May	83.0	72.5	80.5	72.6	68.0	121.8	77.0	107.7	90.0
27-May	84.0	73.0	81.0	72.9	70.0	123.2	79.4	108.6	90.6
3-Jun	84.0	73.7	81.4	73.5	71.0	130.9	79.1	111.3	90.9
10-Jun	84.0	73.6	81.7	74.0	71.0	126.7	77.4	111.5	93.7
17-Jun	85.0	73.4	81.9	74.2	71.0	126.7	78.7	110.5	92.8
24-Jun	85.0	73.5	82.0	74.1	72.0	126.7	79.1	111.1	94.0
1-Jul	85.0	73.5	82.4	74.6	72.0	126.7	79.3	112.7	96.0
8-Jul	85.0	73.8	82.7	74.8	72.0	126.7	80.3	114.2	95.6
15-Jul	85.0	73.7	82.9	75.0	72.0	126.7	79.4	115.9	97.7
22-Jul	85.0	73.5	82.9	75.4	72.0	130.9	79.8	115.1	97.5
29-Jul	86.0	74.4	83.2	75.9	73.0	141.4	80.3	117.8	100.1
5-Aug	86.0	74.8	83.5	75.9	73.0	135.1	81.1	117.6	99.6
12-Aug	86.0	74.5	83.7	76.0	73.0	132.3	80.2	118.2	101.1
19-Aug	86.0	75.5	83.9	76.2	74.0	140.7	80.6	119.5	101.3
26-Aug	86.0	75.8	84.1	76.5	73.0	140.7	81.2	119.3	102.5
2-Sep	87.0	75.0	84.0	76.3	73.0	132.3	79.3	118.6	101.0
9-Sep	87.0	75.8	84.2	76.4	74.0	135.8	80.7	119.6	101.8
16-Sep	87.0	76.9	84.4	76.6	74.0	135.8	81.9	121.8	101.9
23-Sep	87.0	76.7	84.4	76.3	73.0	140.0	82.0	121.6	100.8
30-Sep	87.0	75.8	84.3	76.4	73.0	135.1	81.8	121.6	101.9
7-Oct	87.0	75.6	84.2	76.4	73.0	131.6	81.5	119.7	100.2
14-Oct	86.0	75.2	83.7	75.8	73.0	135.8	81.8	119.0	98.1
21-Oct	86.0	75.4	83.1	75.8	73.0	131.6	79.8	118.9	97.8
28-Oct	85.0	74.1	82.5	75.1	71.0	130.2	79.1	114.4	92.8
4-Nov	84.0	74.6	82.0	74.2	71.0	135.1	81.2	116.7	94.9
11-Nov	84.0	73.7	81.8	74.4	71.0	130.9	79.9	116.2	94.5
18-Nov	84.0	73.7	80.9	73.7	70.0	127.4	79.5	112.5	90.7
25-Nov	84.0	73.1	80.6	73.8	70.0	126.7	77.7	112.2	91.2
2-Dec	84.0	73.5	80.5	72.7	69.0	126.7	78.8	112.0	90.1
9-Dec	83.0	73.5	79.8	72.1	67.0	123.2	78.1	107.2	85.6
16-Dec	83.0	72.9	79.5	72.1	68.0	123.2	76.9	106.2	84.2
23-Dec	82.0	72.3	78.8	70.8	66.0	119.0	77.0	103.5	81.1
31-Dec	82.0	71.7	78.8	70.7	66.0	122.5	77.1	104.8	82.9



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	274	0
FEB	237	0
MAR	275	0
APR	294	0
MAY	342	0
JUN	383	0
JUL	427	0
AUG	454	0
SEP	443	0
OCT	411	0
NOV	355	0
DEC	309	0
ANN	4203	0

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



	Average Sensible Cooling Load	Average Sensible Heating Load	Average Latent Cooling Load	Average Latent Heating Load
	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)
JAN	716	-43	6148	0
FEB	576	-72	4899	0
MAR	740	-51	5720	0
APR	858	-17	6830	0
MAY	1459	-10	8853	0
JUN	2336	-1	10870	0
JUL	3110	0	13131	0
AUG	3759	0	14830	0
SEP	3815	0	14546	0
OCT	3117	0	12172	0
NOV	1894	-3	10472	0
DEC	1041	-27	7517	0
ANN	23421	-224	115988	0

Average Annual Solar Radiation – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

City: HONOLULU
 State: HI
 WBAN No: 22521
 Lat(N): 21.33
 Long(W): 157.92
 Elev(ft): 16

Stn Type: Primary
 SHADING GEOMETRY IN DIMENSIONLESS UNITS
 Window: 1
 Overhang: 1.193
 Vert Gap: 0.2

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	1240	1490	1710	1870	2010	2070	2090	2050	1880	1590	1310	1180	1710
	Std Dev	89	118	135	115	98	60	69	78	73	68	73	81	37
	Minimum	1020	1180	1410	1600	1780	1950	1940	1850	1700	1470	1150	1020	1590
	Maximum	1390	1630	1930	2060	2170	2170	2200	2180	2000	1710	1430	1300	1780
	Diffuse	500	550	660	750	740	740	700	670	650	590	530	470	630
Clear Day	Global	1650	1930	2250	2490	2600	2620	2600	2510	2320	2000	1700	1560	2190
NORTH	Global	320	370	410	480	630	780	710	530	430	380	340	310	470
	Diffuse	320	370	410	460	490	530	500	460	420	380	340	310	420
Clear Day	Global	280	310	350	430	680	910	800	500	350	320	280	260	460
EAST	Global	750	890	980	1030	1090	1100	1110	1110	1070	950	780	730	970
	Diffuse	410	460	520	580	590	590	580	570	550	490	430	390	510
Clear Day	Global	1020	1160	1300	1390	1410	1400	1400	1390	1320	1190	1040	970	1250
SOUTH	Global	1330	1280	1010	680	490	460	450	580	890	1180	1300	1350	920
	Diffuse	520	540	540	510	460	460	450	470	520	550	540	510	500
Clear Day	Global	2000	1780	1320	740	420	390	380	570	1070	1620	1930	2030	1180
WEST	Global	740	860	950	1000	1050	1090	1110	1110	1030	890	760	690	940
	Diffuse	400	460	530	580	590	590	580	570	550	490	430	390	510
Clear Day	Global	1020	1160	1300	1390	1410	1400	1400	1390	1320	1190	1040	970	1250

Average Annual Solar Heat and Illumination – Nearest Available Site

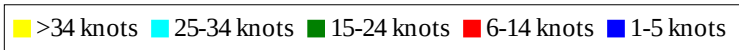
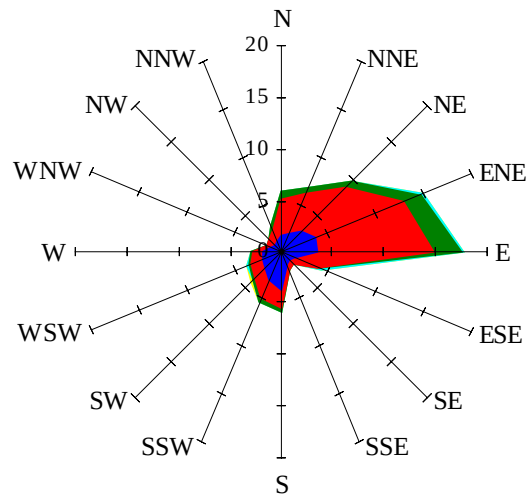
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

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	880	1070	1240	1360	1470	1520	1540	1500	1370	1150	930	830	1240
NORTH	Unshaded	220	250	290	320	380	450	410	330	290	270	240	210	310
	Shaded	170	190	220	240	270	300	290	260	230	210	180	160	230
EAST	Unshaded	520	630	700	740	780	780	790	800	770	670	550	510	690
	Shaded	310	370	400	410	440	440	440	450	440	390	330	300	390
SOUTH	Unshaded	960	870	620	400	320	320	310	350	520	770	920	990	610
	Shaded	300	250	260	260	250	250	250	260	270	260	270	330	270
WEST	Unshaded	520	600	680	710	750	780	790	790	740	630	530	480	670
	Shaded	310	350	380	400	420	440	440	450	420	370	310	290	380

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	38	81	98	86	46	53	90	105	90	54
	M.Cloudy	27	59	75	64	32	41	73	87	75	42
NORTH	M.Clear	10	15	17	16	12	29	24	19	24	29
	M.Cloudy	10	17	19	18	12	23	24	19	24	23
EAST	M.Clear	76	69	22	16	12	77	63	16	16	13
	M.Cloudy	38	47	22	18	12	52	52	17	18	14
SOUTH	M.Clear	25	49	59	52	30	13	16	15	16	13
	M.Cloudy	16	36	46	39	20	14	18	17	18	14
WEST	M.Clear	10	15	17	62	77	13	16	15	61	77
	M.Cloudy	10	17	19	46	40	14	18	17	52	52
M.Clear	(% hrs)	45	40	38	38	39	41	37	35	37	40
		Sept					Dec				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	47	87	100	85	44	25	63	76	61	23
	M.Cloudy	36	70	84	69	33	17	44	55	43	16
NORTH	M.Clear	12	16	17	16	11	8	14	15	14	8
	M.Cloudy	13	18	19	18	12	7	14	17	15	7
EAST	M.Clear	79	65	17	16	11	56	55	16	14	8
	M.Cloudy	51	53	19	18	12	25	35	17	15	7
SOUTH	M.Clear	22	42	49	41	20	41	74	83	72	36
	M.Cloudy	19	38	44	36	17	19	44	54	43	17
WEST	M.Clear	12	16	18	66	76	8	14	17	56	51
	M.Cloudy	13	18	20	54	46	7	14	18	35	22
M.Clear	(% hrs)	50	44	39	40	42	48	45	39	41	42

Wind Summary - December, January, and February

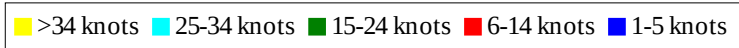
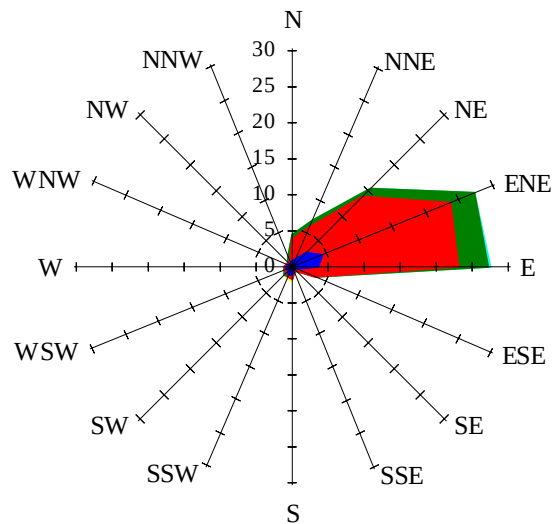
Labels of Percent Frequency on North Axis



Percent Calm = 9.25

Wind Summary - March, April, and May

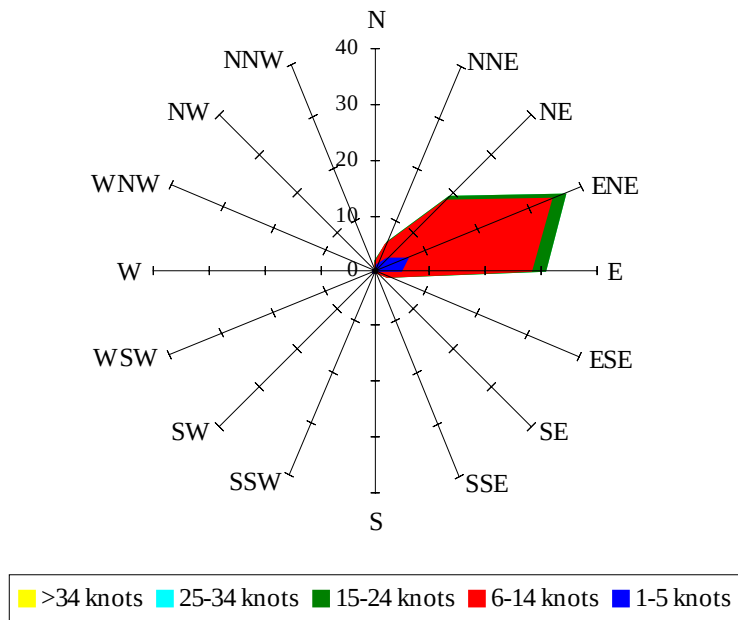
Labels of Percent Frequency on North Axis



Percent Calm = 4.41

Wind Summary - June, July, and August

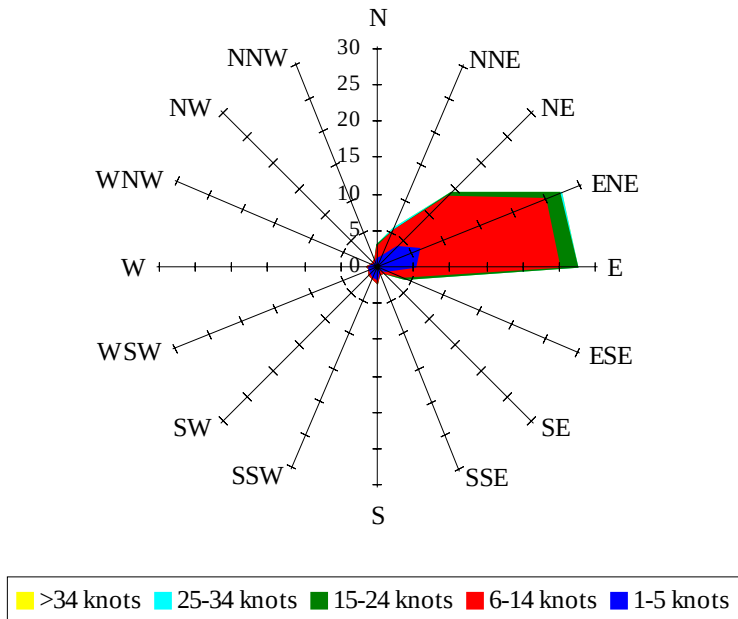
Labels of Percent Frequency on North Axis



Percent Calm = 1.99

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 6.39