UDON THANI, TH	
Latitude = 17.39 N	Station ID = ICAO_VTUD
Longitude =102.79 E	Elevation = 579 Feet
Period of Record = 1988 To 2017	Average Pressure = 29.18 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	105	76	93	4.5	VRB
0.4% Occurrence	102	76	96	4.1	VRB
1.0% Occurrence	100	76	100	4.4	VRB
2.0% Occurrence	98	76	104	4.4	VRB
Mean Daily Range	17	-	-	-	E
97.5% Occurrence	64	60	71	1.5	E
99.0% Occurrence	60	57	64	1.2	E
99.6% Occurrence	57	54	58	0.9	VRB
Median of Extreme Lows	51	48	46	1.1	W

Wet Bulb Temperature (T_{wb})	**Design Value (°F)**	**Dry Bulb Temperature (°F)**	**Humidity Ratio (gr/lb)**	**Wind Speed (mph)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	84	93	160	3.6	VRB
0.4% Occurrence	81	90	145	3.2	VRB
1.0% Occurrence	81	90	145	3.2	VRB
2.0% Occurrence	80	89	141	3.1	VRB

Humidity Ratio (HR)	**Design Value (gr/lb)**	**Dry Bulb Temperature (°F)**	**Vapor Pressure (in. Hg)**	**Wind Speed (mph)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	165	85	1.05	3.5	VRB
0.4% Occurrence	154	84	0.99	2.9	VRB
1.0% Occurrence	153	84	0.99	2.4	VRB
2.0% Occurrence	149	84	0.96	1.5	S

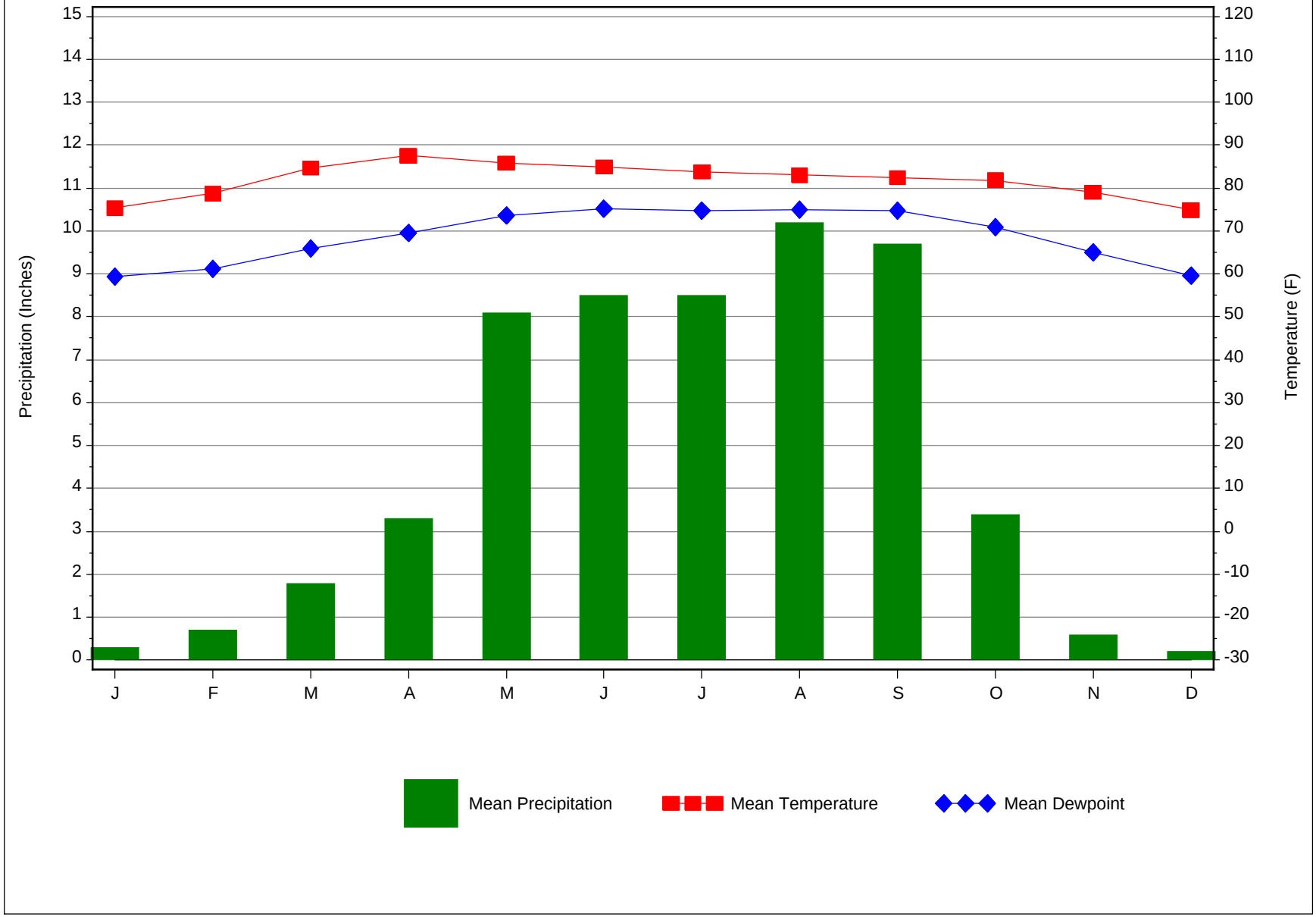
Air Conditioning/ Humid Area Criteria	**Threshold**	**T ≥ 93°F**	**T ≥ 80°F**	**Twb ≥ 73°F**	**Twb ≥ 67°F**
	# of Hours	531	4265	4190	5569

Other Site Data

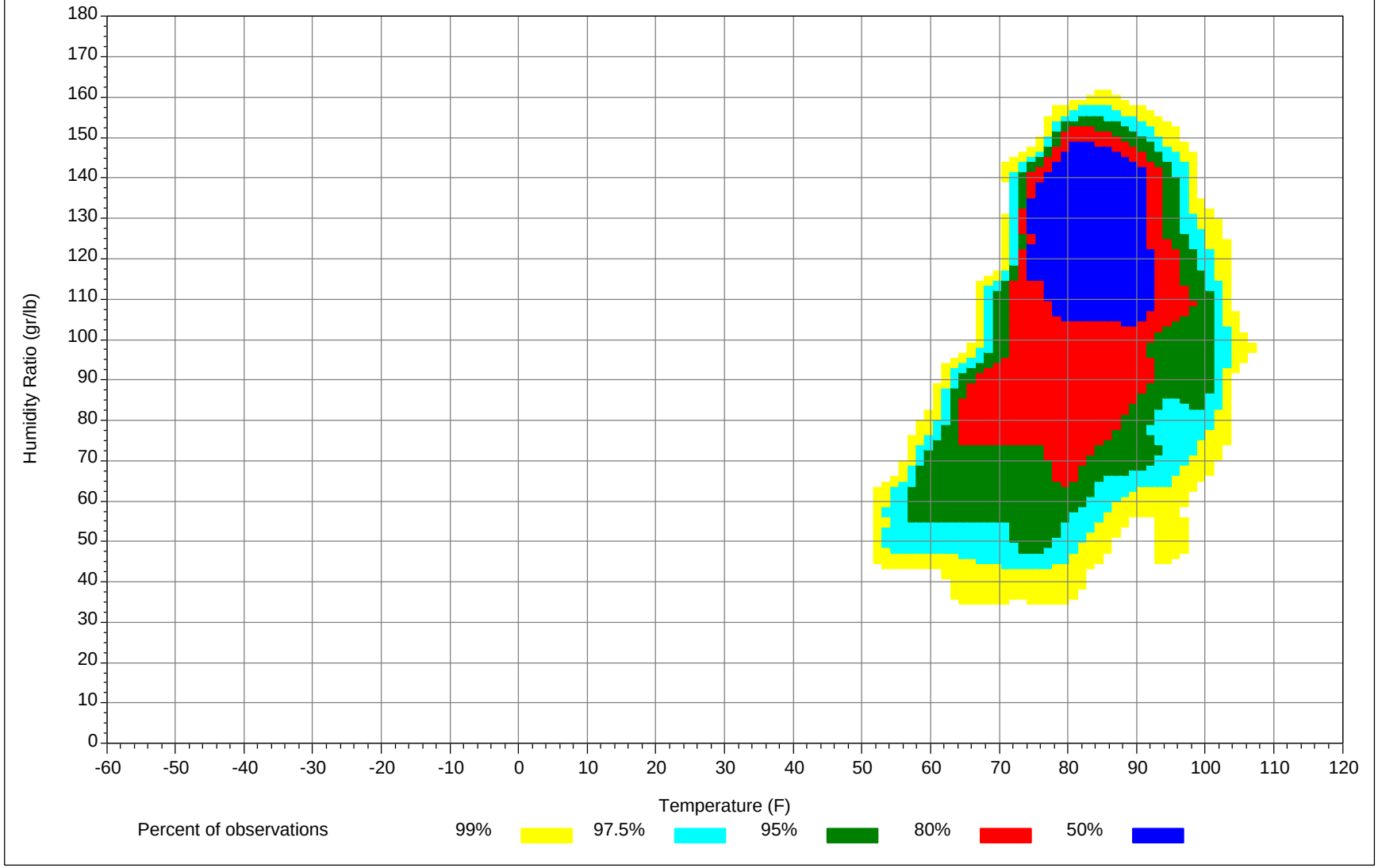
Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
10	N/A	85	12.4 + 5.9
Ground Water Temperature (°F) 50 Foot Depth*	Frost Depth 50 Year Recurrence (in)	Ground Snow Load 50 Year Recurrence (lb/ft^2)	Average Annual Freeze-Thaw Cycles (#)
84.3	0	0	0

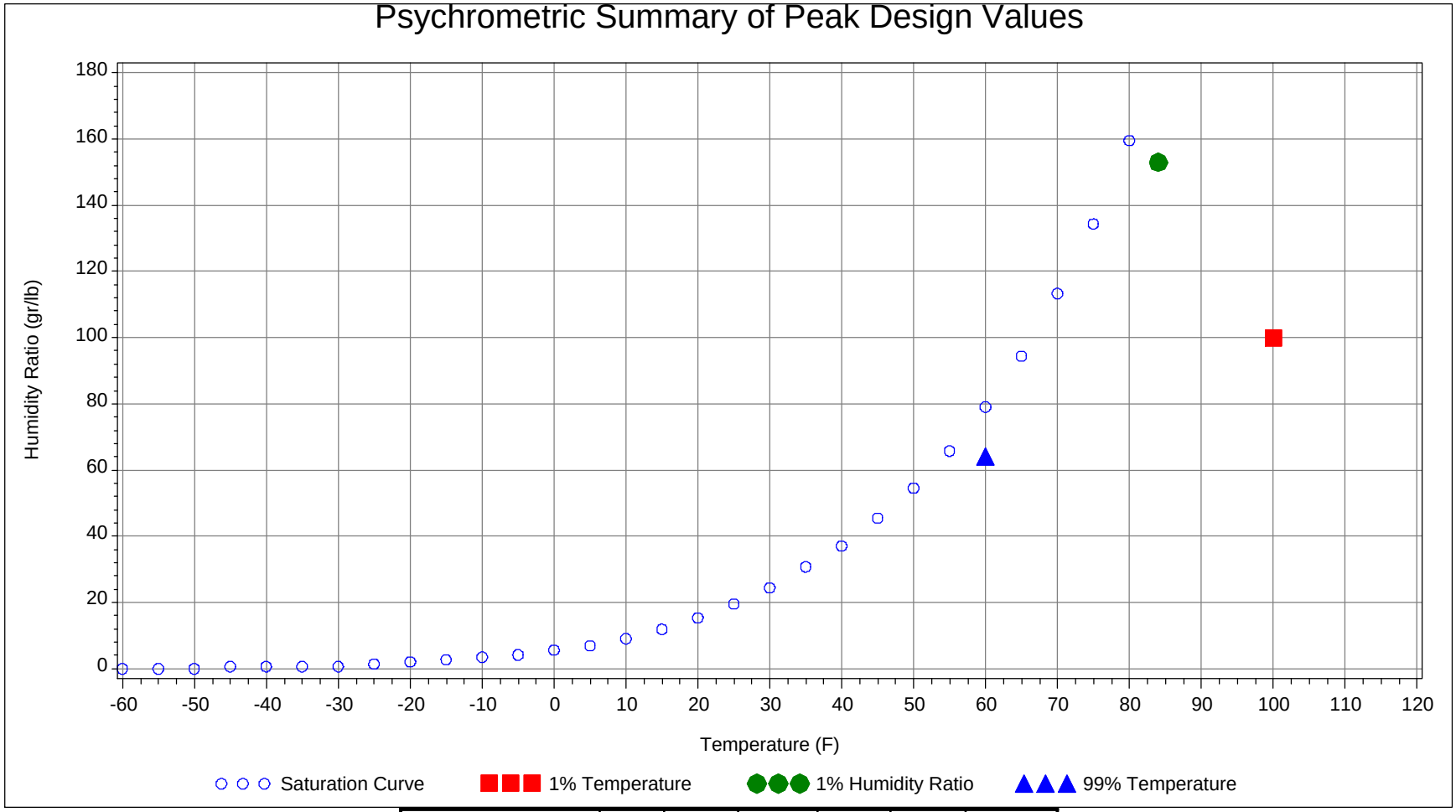
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

Average Annual Climate



Long Term Psychrometric Summary





	(°F) / (gr/lb)	MCDB (°F)	MCWB (°F)	MCDP (°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
1.0% Dry Bulb	100.0		76		100.0	39.7
99.0% Dry Bulb	60.0				64.0	24.4
1.0% Humidity Ratio	153.0	84.0	79.9	78.7		44.0

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**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**
105/109												1	0	1	75.4
100/104							1	0	1	72.7		22	7	29	74.4
95/ 99		2	0	2	72.4		15	3	18	71.6		50	27	77	74.6
90/ 94		22	7	29	71.3		41	20	61	71.5		56	50	106	74.4
85/ 89	0	50	23	73	70		45	38	83	70.7	4	48	64	116	73.2
80/ 84	0	63	52	115	67.9	3	51	58	112	69.1	40	39	56	135	71.9
75/ 79	7	52	67	126	66	29	38	57	124	67.4	97	20	27	144	70.2
70/ 74	44	37	62	143	64.4	75	21	32	128	65.5	73	9	11	93	66.9
65/ 69	83	16	26	125	61.9	64	9	11	84	62.1	25	3	3	31	62.4
60/ 64	81	5	8	94	58.6	42	3	4	49	58.5	7	1	1	9	58.7
55/ 59	24	1	2	27	54.1	9	0	1	10	54.4	2	0	0	2	55
50/ 54	8	0	0	8	49.6	2			2	49.5	0			0	51
45/ 49	1			1	46.2	0			0	44					
40/ 44															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**
105/109		3	0	3	77		0		0	77.7					
100/104		33	8	41	76.3		10	2	12	78.2		0	0	0	80
95/ 99	0	58	31	89	76.5	0	39	15	54	78.4		15	5	20	79.4
90/ 94	1	66	57	124	75.9	0	77	43	120	78		77	35	112	78.7
85/ 89	19	43	66	128	75.2	16	68	67	151	77.5	6	88	78	172	78.3
80/ 84	97	26	51	174	74.3	107	42	81	230	76.5	125	50	94	269	77.4
75/ 79	96	10	23	129	72.5	118	11	38	167	75	107	9	28	144	75.8
70/ 74	24	2	4	30	69.1	7	1	1	9	71.3	2	0	0	2	72.2
65/ 69	2		0	2	63.6								0	0	69
60/ 64	0			0	58.6										
55/ 59															
50/ 54															
45/ 49															
40/ 44															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**
105/109															
100/104		0	0	0	76.9										
95/ 99	0	6	3	9	79.1	0	2	0	2	79.9		1	0	1	79.4
90/ 94	0	63	26	89	78.5	0	47	16	63	78.7	0	50	12	62	78.4
85/ 89	3	93	68	164	77.9	0	98	59	157	78	0	96	54	150	77.7
80/ 84	103	70	106	279	77.1	79	78	119	276	77.1	48	74	119	241	77.2
75/ 79	141	16	45	202	75.6	164	23	53	240	75.6	176	19	54	249	75.4
70/ 74	2	0	0	2	72.2	4	0	0	4	72.6	16	0	1	17	72.1
65/ 69		0		0	68										
60/ 64															
55/ 59															
50/ 54															
45/ 49															
40/ 44															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**
105/109															
100/104															
95/ 99		1		1	78.5		3	0	3	75.5		0		0	78.5
90/ 94		47	5	52	76.7		33	5	38	74.8		12	2	14	73.8
85/ 89	0	107	42	149	75.1	0	75	25	100	72.3		50	13	63	70.7
80/ 84	24	70	116	210	74.6	4	77	75	156	70.6	1	77	51	129	68.2
75/ 79	162	21	75	258	73.5	57	39	87	183	69.6	11	58	79	148	66.1
70/ 74	54	3	9	66	69.3	102	11	38	151	67.1	54	34	64	152	64.3
65/ 69	6	0	1	7	64	50	2	8	60	63.3	76	13	28	117	61.7
60/ 64	2			2	59.4	23	0	1	24	59.3	68	4	10	82	58.4
55/ 59	0			0	56.7	4	0		4	54.9	30	1	2	33	54.3
50/ 54						0			0	50.3	7	0	0	7	49.8
45/ 49											1			1	44
40/ 44											0			0	40

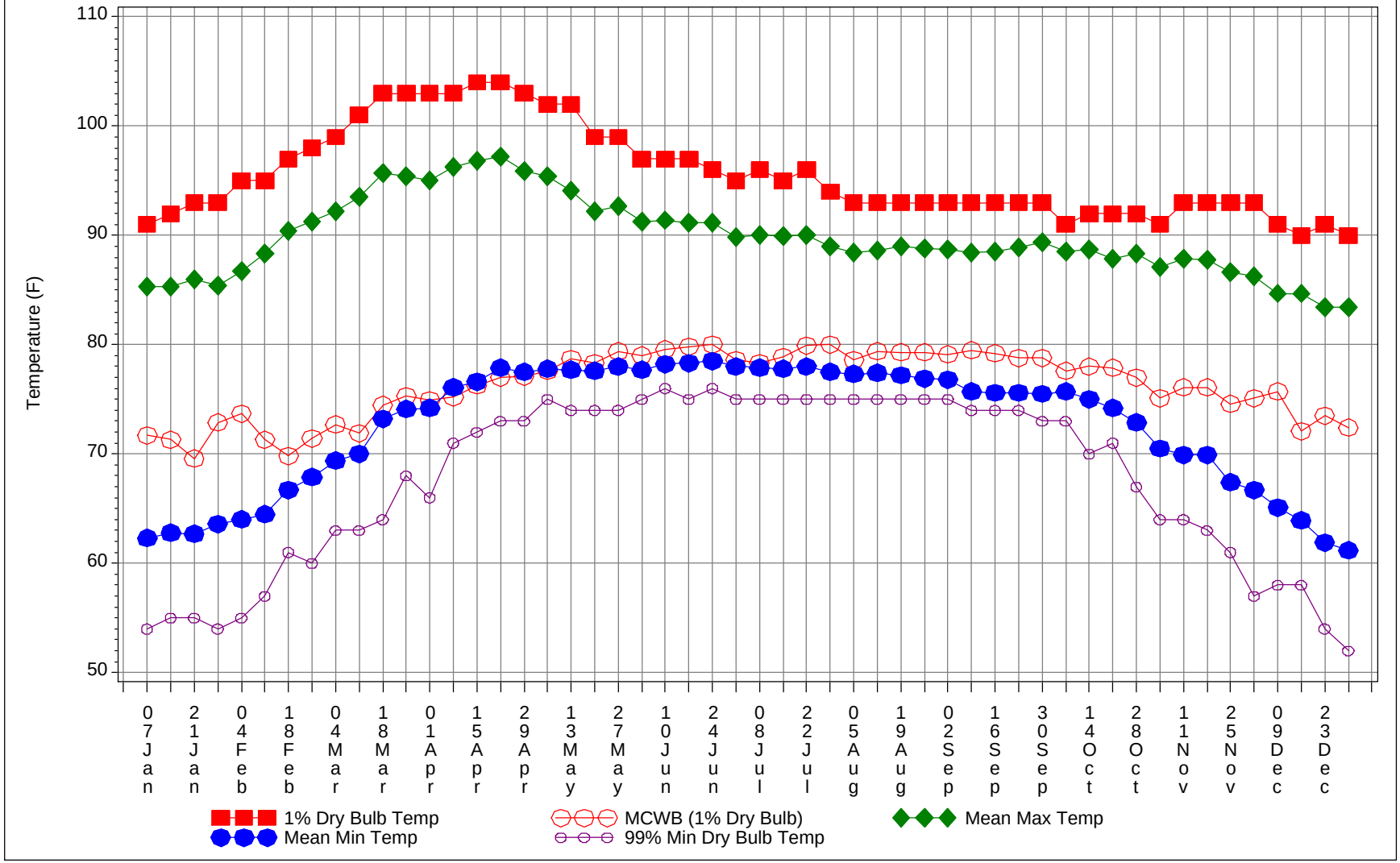
Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary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

Dry-Bulb Temperature Hours For An Average Year

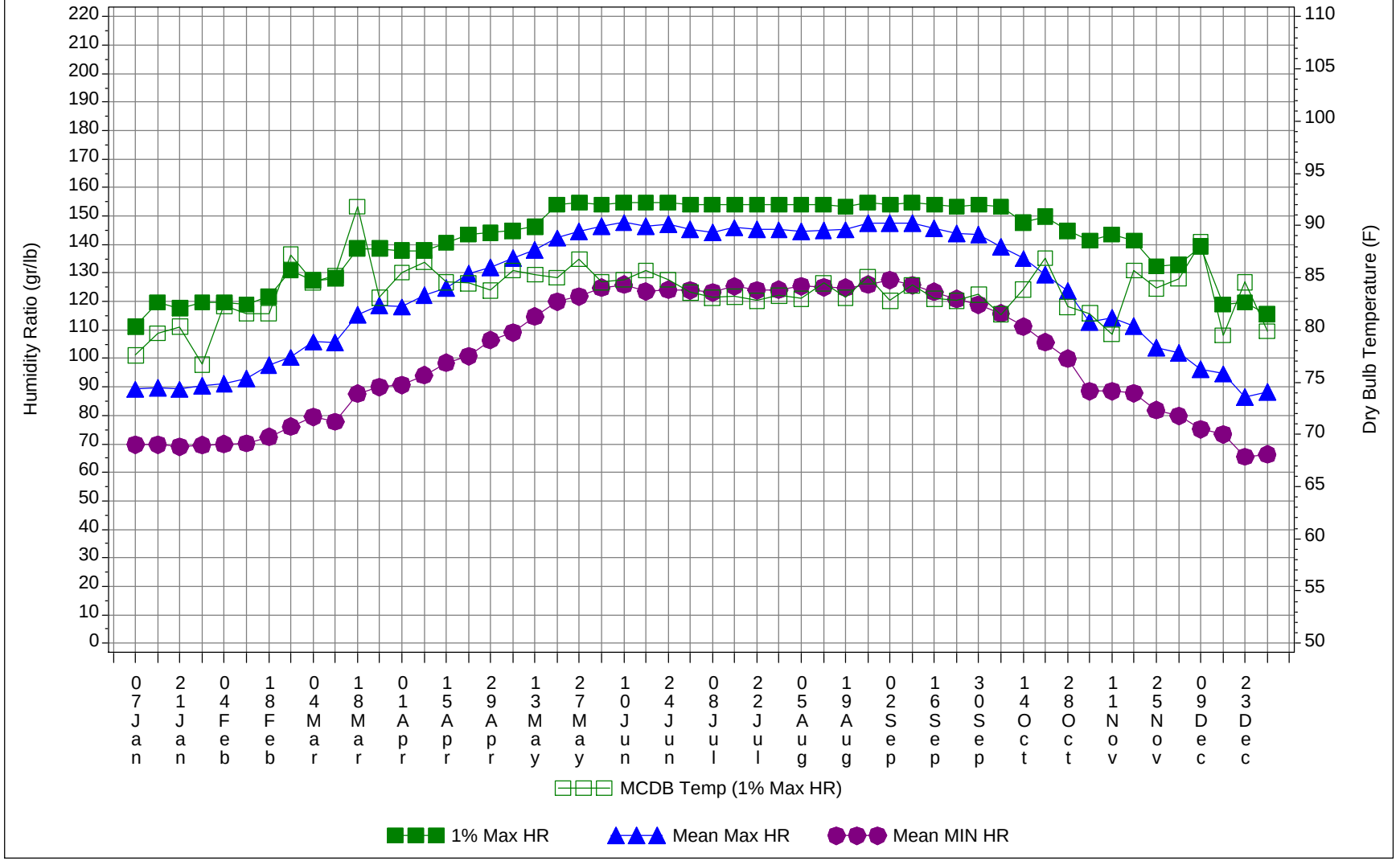
	Annual				
Temperature Range (°F)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°F)**
105/109		4	0	4	76.7
100/104		65	17	82	75.9
95/ 99	0	191	84	275	76.3
90/ 94	1	590	277	868	76.5
85/ 89	47	860	598	1505	75.5
80/ 84	629	716	979	2324	74.3
75/ 79	1194	315	634	2143	72.2
70/ 74	448	118	223	789	66.2
65/ 69	297	43	78	418	62.2
60/ 64	216	14	24	254	58.6
55/ 59	67	2	5	74	54.3
50/ 54	17	0	1	18	49.7
45/ 49	3			3	44.9
40/ 44	0			0	40

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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



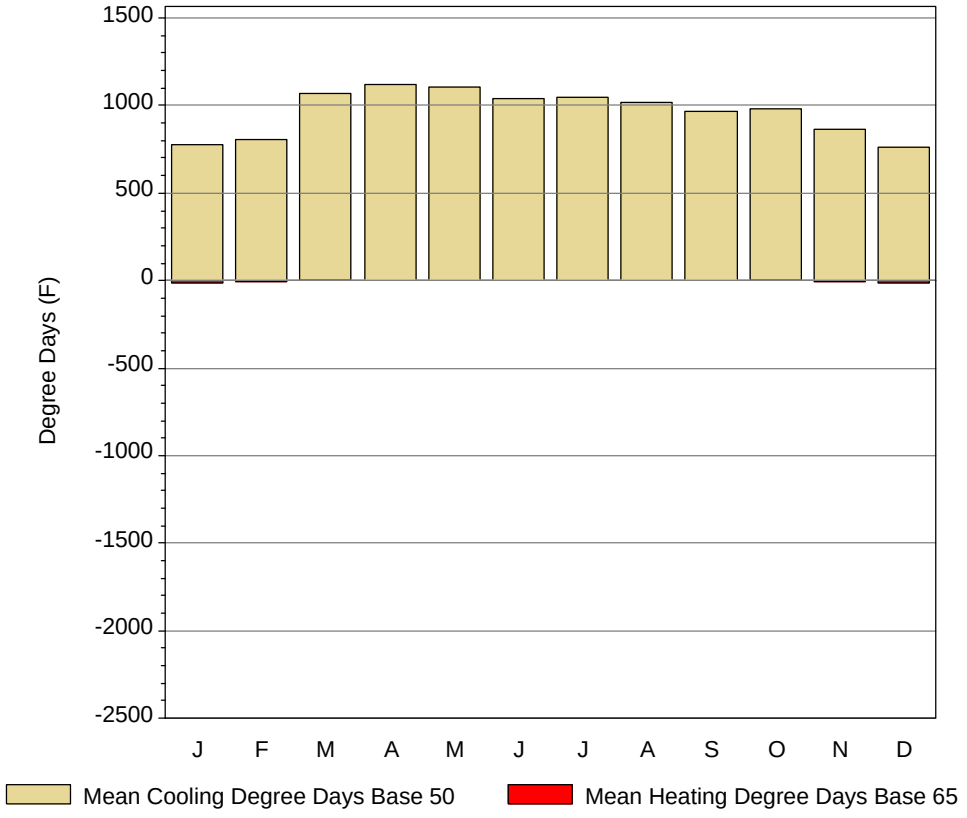
Long Term Humidity and Dry Bulb Temperature Summary



Long Term Humidity and Dry Bulb Temperature Summary

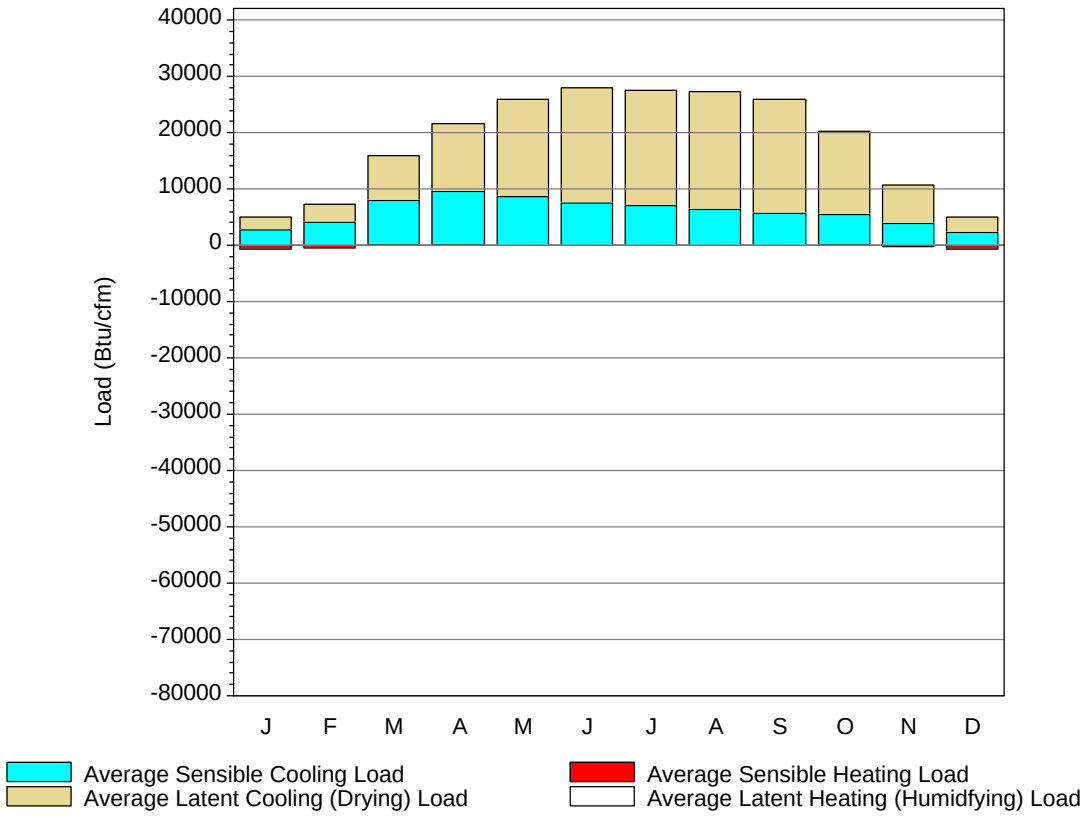
Week Ending	1.0% Temp (°F)	MCWB@ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB@ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	91	71.7	85.3	62.3	54	111.3	77.6	89.2	69.8
14-Jan	92	71.3	85.3	62.8	55	119.7	79.7	89.6	69.7
21-Jan	93	69.6	86	62.7	55	117.6	80.3	89.2	69
28-Jan	93	72.9	85.4	63.6	54	119.7	76.7	90.4	69.5
4-Feb	95	73.7	86.7	64	55	119.7	82.3	91.1	70
11-Feb	95	71.3	88.3	64.5	57	119	81.6	93.1	70.2
18-Feb	97	69.8	90.4	66.7	61	121.8	81.6	97.6	72.5
25-Feb	98	71.4	91.3	67.9	60	130.9	87.2	100.4	76.1
4-Mar	99	72.7	92.2	69.4	63	127.4	84.6	105.8	79.5
11-Mar	101	71.9	93.5	70	63	128.1	85.2	105.6	77.8
18-Mar	103	74.5	95.7	73.2	64	138.6	91.8	115.4	87.7
25-Mar	103	75.3	95.4	74.1	68	138.6	83.1	118.6	89.9
1-Apr	103	74.9	95	74.2	66	137.9	85.5	118.1	90.7
8-Apr	103	75.2	96.3	76.1	71	137.9	86.5	122.3	94.2
15-Apr	104	76.3	96.8	76.6	72	140.7	84.6	124.8	98.5
22-Apr	104	77	97.2	77.9	73	143.5	84.5	129.8	100.8
29-Apr	103	77.1	95.9	77.5	73	144.2	83.8	131.9	106.5
6-May	102	77.6	95.4	77.8	75	144.9	85.7	135.2	109.1
13-May	102	78.7	94.1	77.7	74	146.3	85.3	138.1	114.8
20-May	99	78.3	92.2	77.6	74	154	85	142.3	119.9
27-May	99	79.4	92.7	78	74	154.7	86.8	144.7	121.8
4-Jun	97	79	91.3	77.7	75	154	84.6	146.5	124.8
10-Jun	97	79.6	91.4	78.2	76	154.7	84.8	147.7	125.9
17-Jun	97	79.8	91.2	78.3	75	154.7	85.7	146.5	123.5
24-Jun	96	80	91.2	78.5	76	154.7	84.8	147.2	124.1
1-Jul	95	78.6	89.8	78	75	154	83.6	145.4	124
8-Jul	96	78.3	90	77.9	75	154	83.1	144.4	123.3
15-Jul	95	78.9	89.9	77.8	75	154	83.2	145.9	125.3
22-Jul	96	79.9	90	78	75	154	82.8	145.4	123.9
29-Jul	94	80	89	77.5	75	154	83.3	145.2	124.1
5-Aug	93	78.6	88.4	77.3	75	154	83	144.6	125.4
12-Aug	93	79.4	88.6	77.4	75	154	84.5	144.9	125.1
19-Aug	93	79.3	89	77.2	75	153.3	83.1	145.2	124.8
26-Aug	93	79.3	88.8	76.9	75	154.7	85.1	147.4	126
2-Sep	93	79.1	88.7	76.8	75	154	82.8	147.5	127.5
9-Sep	93	79.5	88.4	75.7	74	154.7	84.3	147.4	125.7
16-Sep	93	79.2	88.5	75.6	74	154	83	145.8	123.4
23-Sep	93	78.8	88.9	75.6	74	153.3	82.8	143.8	120.9
30-Sep	93	78.8	89.4	75.5	73	154	83.4	143.5	118.9
7-Oct	91	77.6	88.5	75.7	73	153.3	81.5	139.1	115.8
14-Oct	92	78	88.7	75	70	147.7	83.9	135.1	111.2
21-Oct	92	77.9	87.9	74.2	71	149.8	86.9	129.6	105.7
28-Oct	92	77	88.3	72.9	67	144.9	82.2	123.7	99.9
4-Nov	91	75.1	87.1	70.5	64	141.4	81.6	112.7	88.6
11-Nov	93	76.1	87.9	69.9	64	143.5	79.6	114.3	88.5
18-Nov	93	76.1	87.8	69.9	63	141.4	85.7	111.5	87.8
25-Nov	93	74.6	86.6	67.4	61	132.3	84	103.8	81.8
2-Dec	93	75.1	86.3	66.7	57	133	84.9	101.9	79.8
9-Dec	91	75.7	84.7	65.1	58	139.3	88.4	96.2	75.1
16-Dec	90	72.1	84.7	63.9	58	119	79.5	94.6	73.3
23-Dec	91	73.5	83.4	61.9	54	119.7	84.6	86.4	65.5
31-Dec	90	72.4	83.4	61.2	52	115.5	79.9	88.2	66.3

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	775.3	324.9	14.5
FEB	806.9	388.7	5.8
MAR	1066.8	602.8	1
APR	1118.9	669	0
MAY	1105.9	640.9	0
JUN	1043.2	593.2	0
JUL	1045.7	580.7	0
AUG	1020.6	555.6	0
SEP	969.6	519.6	0
OCT	979.3	514.4	0.1
NOV	861	413.2	2.2
DEC	761.4	311.2	15
ANN	11554.6	6114.2	38.6

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	2658	-754	2300	-5
FEB	4026	-337	3356	-2
MAR	8036	-71	7991	0
APR	9619	-1	12006	0
MAY	8587	0	17237	0
JUN	7596	0	20375	0
JUL	7020	0	20594	0
AUG	6371	0	20918	0
SEP	5713	0	20129	0
OCT	5462	-9	14708	0
NOV	3826	-146	6902	0
DEC	2321	-755	2799	-10
ANN	71235	-2073	149315	-17

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	N/A	N/A	N/A
Lat, Lon, Elev	N/A	N/A	N/A
Press Stn Type	N/A	N/A	N/A

AVERAGE INCIDENT SOLAR RADIATION
(Btu/sq.ft./day), Percentage Uncertainty = 9

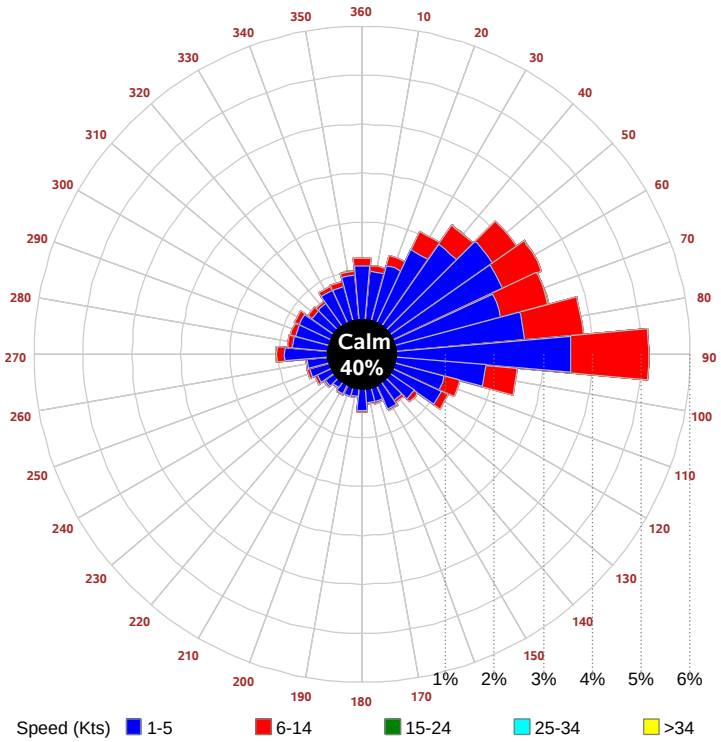
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Global													
	Std.Dev.													
	Minimum													
	Maximum													
	Diffuse													
Clear Day	Global													
NORTH	Global													
	Diffuse													
Clear Day	Global													
EAST	Global													
	Diffuse													
Clear Day	Global													
SOUTH	Global													
	Diffuse													
Clear Day	Global													
WEST	Global													
	Diffuse													
Clear Day	Global													

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													
NORTH	Unshaded													
	Shaded													
EAST	Unshaded													
	Shaded													
SOUTH	Unshaded													
	Shaded													
WEST	Unshaded													
	Shaded													

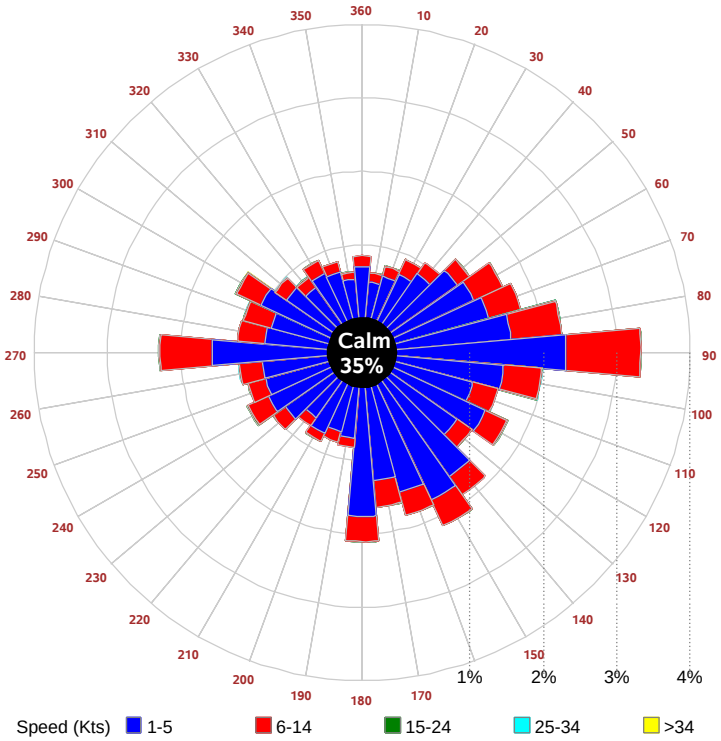
AVERAGE INCIDENT ILLUMINENCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9											
				March					June		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear										
	M.Cloudy										
NORTH	M.Clear										
	M.Cloudy										
EAST	M.Clear										
	M.Cloudy										
SOUTH	M.Clear										
	M.Cloudy										
WEST	M.Clear										
	M.Cloudy										
M.Clear	(% hrs)										

				Sept					Dec		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear										
	M.Cloudy										
NORTH	M.Clear										
	M.Cloudy										
EAST	M.Clear										
	M.Cloudy										
SOUTH	M.Clear										
	M.Cloudy										
WEST	M.Clear										
	M.Cloudy										
M.Clear	(% hrs)										

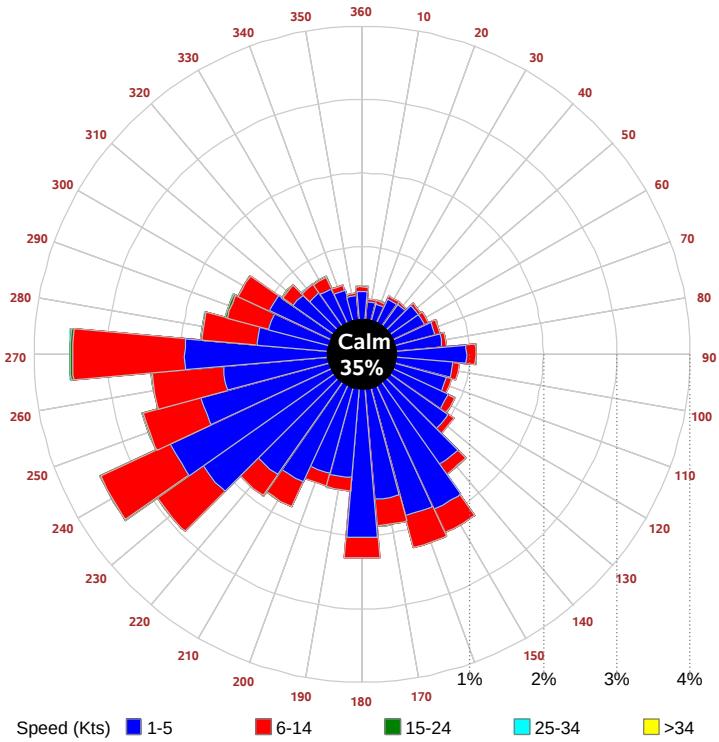
Wind Summary - December, January, and February



Wind Summary - March, April, and May



Wind Summary - June, July, and August



Wind Summary - September, October, and November