

BISMARCK MUNI, ND

Latitude = 46.77 N

Longitude = 100.75 W

Period of Record = 1988 To 2017

Station ID = ICAO_KBIS

Elevation = 1661 Feet

Average Pressure = 28.21 inches Hg

Design Criteria Data

Dry Bulb Temperature (T)	Mean Coincident (Average) Values				
	Design Value (°F)	Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	101	71	73	14.1	S
0.4% Occurrence	93	70	78	13	S
1.0% Occurrence	90	69	80	12.4	SSE
2.0% Occurrence	87	68	79	12.1	SSE
Mean Daily Range	23	-	-	-	NW
97.5% Occurrence	-6	-7	3	8	NW
99.0% Occurrence	-13	-14	2	7.3	W
99.6% Occurrence	-18	-18	1	7.3	W
Median of Extreme Lows	-27	-27	1	6.4	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	78	89	133	12.4	SSE
0.4% Occurrence	75	86	119	11.3	SSE
1.0% Occurrence	72	85	103	11.2	SSE
2.0% Occurrence	70	82	96	11.1	SSE

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	134	84	0.84	9.9	SSE
0.4% Occurrence	123	82	0.77	10.5	SSE
1.0% Occurrence	110	79	0.69	9.7	SSE
2.0% Occurrence	102	77	0.65	9.1	SSE

Air Conditioning/ Humid Area Criteria	Threshold	$T \geq 93^{\circ}\text{F}$	$T \geq 80^{\circ}\text{F}$	$T_{wb} \geq 73^{\circ}\text{F}$	$T_{wb} \geq 67^{\circ}\text{F}$
	# of Hours	48	516	80	466

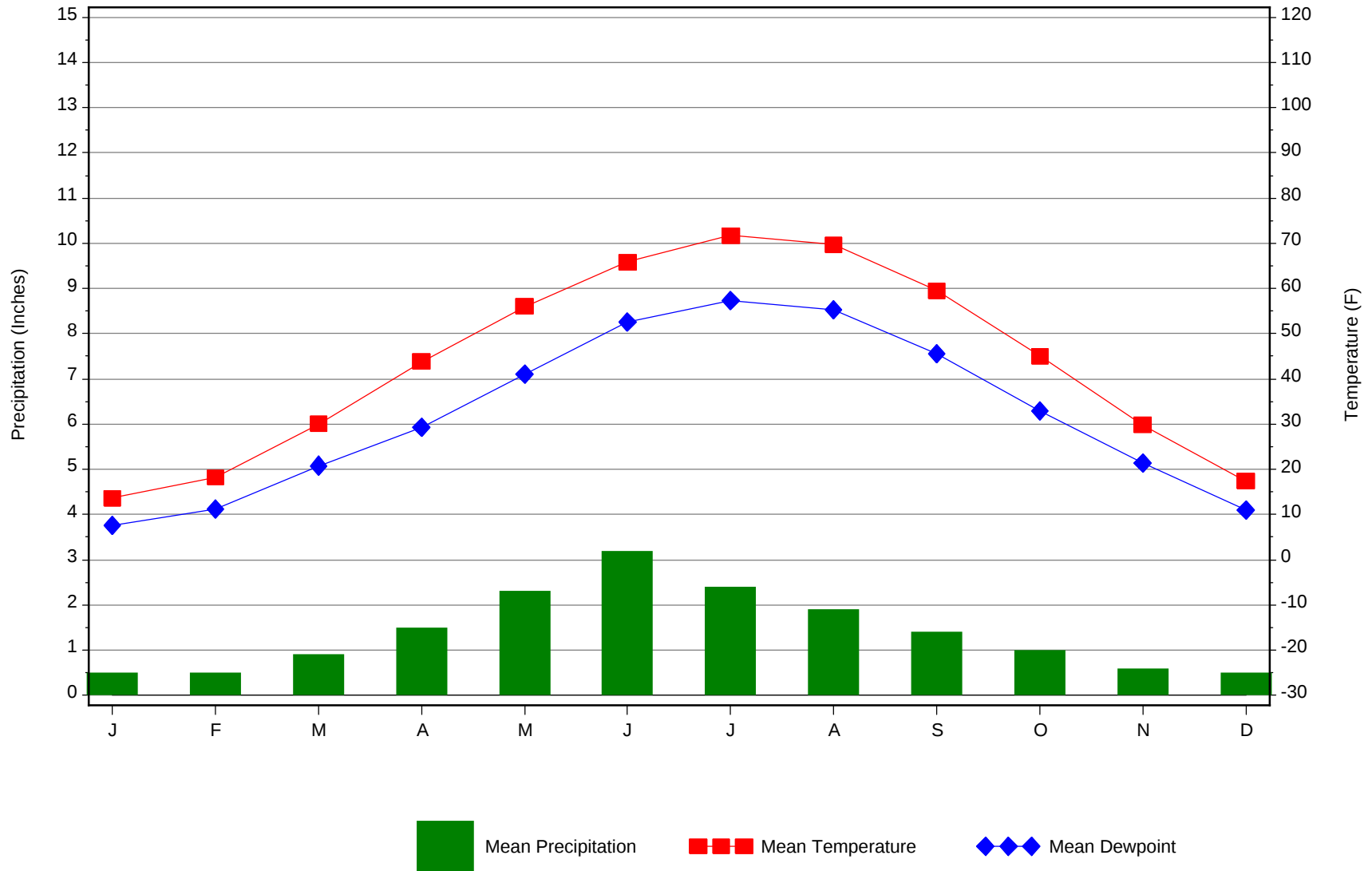
Other Site Data

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
5	3	90	0.5 + 0.5
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 (#)
46	153	40	93

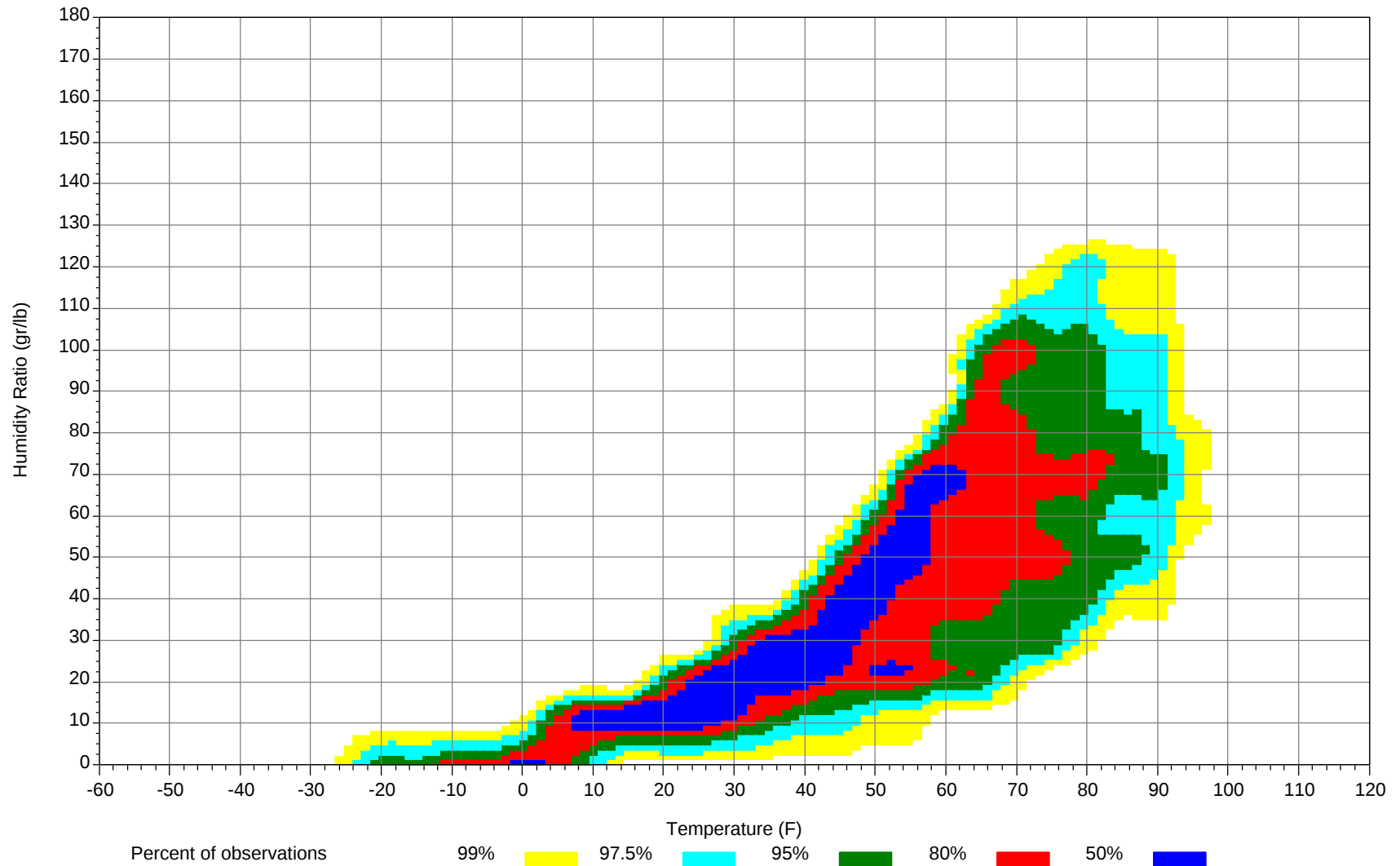
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.



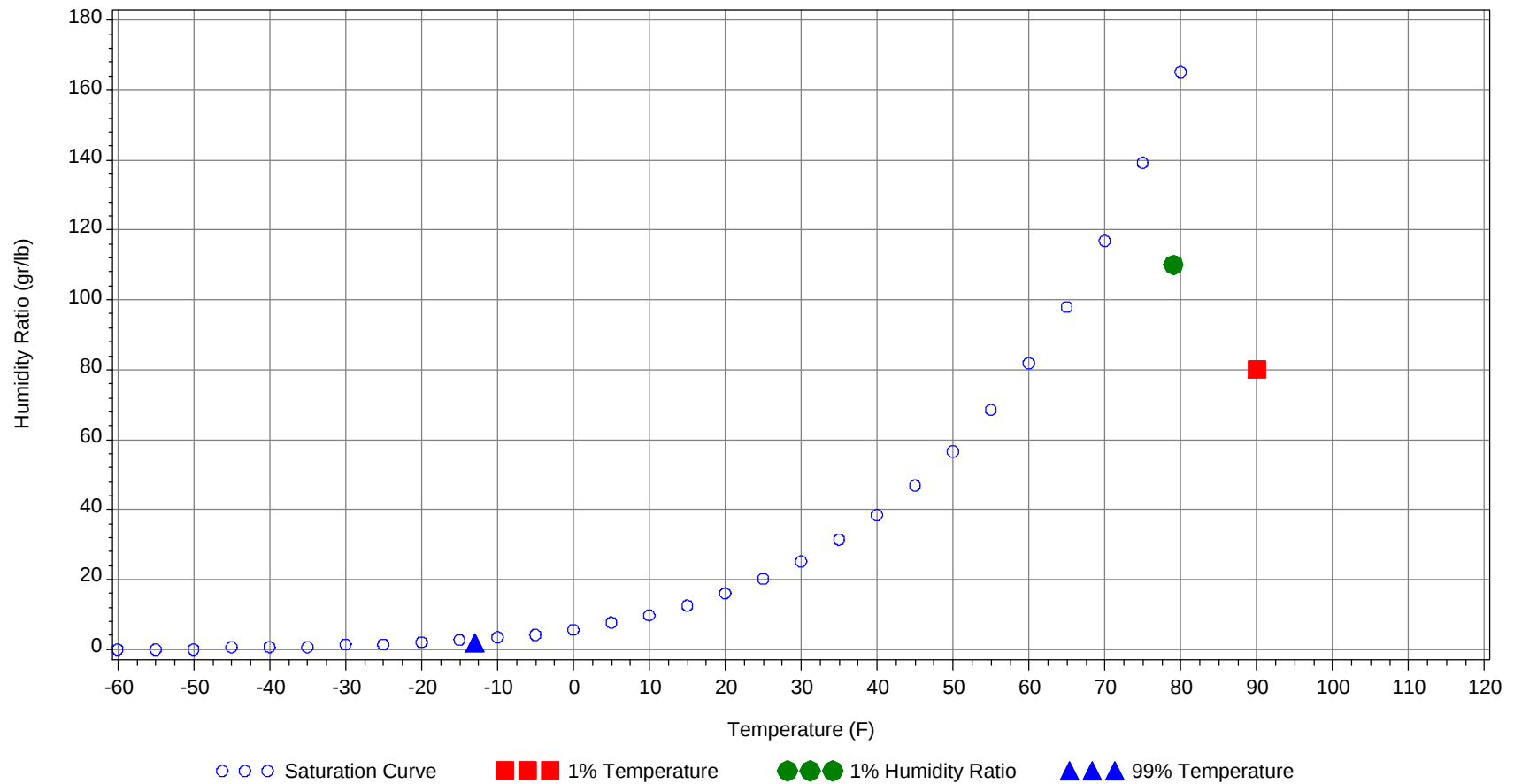
Average Annual Climate



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	90.0		69		80.0	34.3
99.0% Dry Bulb	-13.0				2.0	-2.8
1.0% Humidity Ratio	110.0	79.0	71.2	68.0		36.1

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	January					February					March				
	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)
110/114															
105/109															
100/104															
95/ 99															
90/ 94															
85/ 89															
80/ 84												0	0	0	54.7
75/ 79												0	0	0	55
70/ 74							0		0	49.7		3	1	4	52.1
65/ 69							0	0	0	49.3	0	3	2	5	50.7
60/ 64		0		0	48.3		0	0	0	46.6	0	7	4	11	47.9
55/ 59		0	0	0	43.9		1	0	1	44.3	0	10	7	17	45.1
50/ 54		1	0	1	41.4		3	1	4	42	1	17	11	29	42.6
45/ 49	0	5	1	6	38.8	0	8	4	12	38.7	4	26	19	49	39.8
40/ 44	2	10	5	17	36.2	1	12	6	19	36.1	9	22	21	52	37
35/ 39	9	18	19	46	33.3	12	23	22	57	33.4	27	39	41	107	33.7
30/ 34	19	24	24	67	29.3	21	25	30	76	29.5	51	34	44	129	29.8
25/ 29	27	28	28	83	24.9	30	30	31	91	24.9	50	29	36	115	24.9
20/ 24	21	20	21	62	20.6	23	20	22	65	20.4	25	15	18	58	20.3
15/ 19	34	30	31	95	16.4	29	27	27	83	16.1	29	15	17	61	16.1
10/ 14	24	25	23	72	10.9	24	21	22	67	10.7	17	10	11	38	10.7
5/ 9	23	22	23	68	6.1	23	20	17	60	6.1	11	6	6	23	6.1
0/ 4	27	24	25	76	0.9	19	16	19	54	0.8	8	6	7	21	0.8
-5/ -1	12	13	13	38	-3.5	12	6	9	27	-3.4	4	2	2	8	-3.5
-10/ -6	20	15	19	54	-8	16	6	8	30	-7.8	5	1	2	8	-7.9
-15/-11	12	6	6	24	-12.6	6	2	2	10	-12.5	2	0	0	2	-12.3
-20/-16	10	4	7	21	-16.9	5	2	1	8	-16.8	1	0	0	1	-16.4
-25/-21	6	2	2	10	-21.9	2	1	1	4	-22.1	0			0	-22.3
-30/-26	2	1	0	3	-26.6	1	0	0	1	-27.1	0			0	-26.7
-35/-31	1	0		1	-31.8	1	0	0	1	-31.8					
-40/-36	0	0		0	-36.8	0			0	-36.6					
-45/-41						0			0	-40					

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)
110/114															
105/109												0	0	0	71.8
100/104												0	1	1	70.7
95/ 99												2	1	3	69.7
90/ 94		0	0	0	62.3		1	0	1	67	0	6	3	9	70
85/ 89		0	0	0	60.2		3	2	5	65.4	0	12	7	19	68.3
80/ 84		2	1	3	57.8		10	5	15	62.7	1	36	20	57	65.5
75/ 79		5	3	8	56	0	23	13	36	59.5	3	45	32	80	63.2
70/ 74	0	12	6	18	53.2	2	36	22	60	57	12	48	39	99	61.3
65/ 69	0	13	8	21	50.6	5	33	24	62	54.9	20	31	34	85	59.3
60/ 64	1	26	16	43	48.4	16	45	41	102	52.8	59	35	50	144	57.1
55/ 59	5	30	22	57	45.7	36	35	43	114	50.3	63	16	32	111	53.6
50/ 54	13	35	32	80	43.4	50	29	41	120	47	49	6	17	72	49.8
45/ 49	29	35	41	105	40.7	55	19	31	105	42.7	23	1	4	28	45.2
40/ 44	27	23	27	77	37.3	32	7	14	53	38.8	6	0	1	7	41
35/ 39	52	28	36	116	34	31	5	10	46	35	3	0	0	3	37.2
30/ 34	47	16	26	89	29.6	16	1	3	20	30.5	0			0	33
25/ 29	40	9	14	63	25	5	0	0	5	25.5					
20/ 24	13	2	4	19	20.5	1			1	20.5					
15/ 19	9	2	2	13	16.3	0			0	16.3					
10/ 14	3	0	1	4	11										
5/ 9	1	0	0	1	7.1										
0/ 4	0			0	2										
-5/ -1															
-10/ -6															
-15/-11															
-20/-16															
-25/-21															
-30/-26															
-35/-31															
-40/-36															
-45/-41															

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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)
110/114			0	0	70										
105/109		0	0	0	71.6		0	0	0	70					
100/104		2	1	3	70.5		1	1	2	71.5		0	0	0	71.3
95/ 99		6	4	10	70.9		5	2	7	70.8		1	1	2	67
90/ 94		22	11	33	70.4		19	10	29	68.9		5	2	7	66.8
85/ 89	0	27	17	44	68.9		24	13	37	67.9	0	9	4	13	65.5
80/ 84	2	57	37	96	67.2	1	49	30	80	66.1	0	20	10	30	63.3
75/ 79	9	52	42	103	65.4	5	48	37	90	64.3	1	26	15	42	61.1
70/ 74	34	47	51	132	63.7	23	50	51	124	62.6	4	38	25	67	59.1
65/ 69	48	20	34	102	61.7	37	24	38	99	61	10	30	26	66	57.2
60/ 64	77	11	34	122	58.8	76	20	40	136	58.1	28	40	42	110	54.9
55/ 59	49	3	13	65	54.5	58	6	18	82	53.9	39	32	40	111	51.2
50/ 54	24	0	3	27	50.8	32	2	7	41	50	50	24	38	112	48.1
45/ 49	6	0	0	6	46.5	14	0	1	15	45.4	53	11	25	89	43.7
40/ 44	1			1	42.5	3		0	3	41	26	2	8	36	39.7
35/ 39						1			1	36.8	19	1	5	25	35.6
30/ 34						0			0	33.5	6	0	1	7	31.2
25/ 29											2		0	2	26.3
20/ 24											1		0	1	21.8
15/ 19															
10/ 14															
5/ 9															
0/ 4															
-5/ -1															
-10/ -6															
-15/-11															
-20/-16															
-25/-21															
-30/-26															
-35/-31															
-40/-36															
-45/-41															

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Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	October					November					December				
	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)
110/114															
105/109															
100/104															
95/ 99															
90/ 94		0	0	0	62.3										
85/ 89		1	0	1	59.9										
80/ 84		4	1	5	59.5										
75/ 79		6	2	8	57.9		0		0	54.5					
70/ 74	0	13	5	18	55.2		1	0	1	53.5					
65/ 69	1	14	5	20	52.6		2	0	2	51.4					
60/ 64	3	25	16	44	50.5	0	6	1	7	48.3		0		0	48.3
55/ 59	7	32	23	62	47.9	0	8	2	10	45		1	0	1	43.5
50/ 54	19	39	35	93	45.2	1	16	7	24	42.5		3	0	3	41.3
45/ 49	37	44	48	129	41.8	4	23	15	42	39.3	1	7	2	10	38.6
40/ 44	37	24	36	97	38.1	10	21	20	51	36.7	2	10	6	18	35.8
35/ 39	54	24	36	114	34.4	28	39	38	105	33.4	8	22	17	47	32.7
30/ 34	45	14	23	82	30	48	38	47	133	29.6	22	29	28	79	29.1
25/ 29	28	7	12	47	25.2	49	31	42	122	25	36	36	39	111	25
20/ 24	11	1	2	14	20.8	30	19	22	71	20.5	30	25	27	82	20.7
15/ 19	4	1	2	7	16.6	33	18	23	74	16.1	39	31	34	104	16.3
10/ 14	1	0	0	1	11.6	16	9	11	36	10.9	25	25	24	74	10.8
5/ 9	0	0	0	0	6.5	11	5	7	23	6.4	25	17	21	63	6.3
0/ 4	0		0	0	3.7	6	2	3	11	1.1	21	15	18	54	0.9
-5/ -1	0		0	0	-2.4	2	0	0	2	-2.9	10	7	10	27	-3.5
-10/ -6						2	0	1	3	-7.4	13	9	10	32	-8
-15/-11						1	0	0	1	-11.5	6	4	4	14	-12.4
-20/-16						0			0	-15	5	3	4	12	-16.9
-25/-21											3	1	2	6	-21.7
-30/-26											1	0	0	1	-26.8
-35/-31											1	0	0	1	-32
-40/-36											0			0	-35.3
-45/-41															

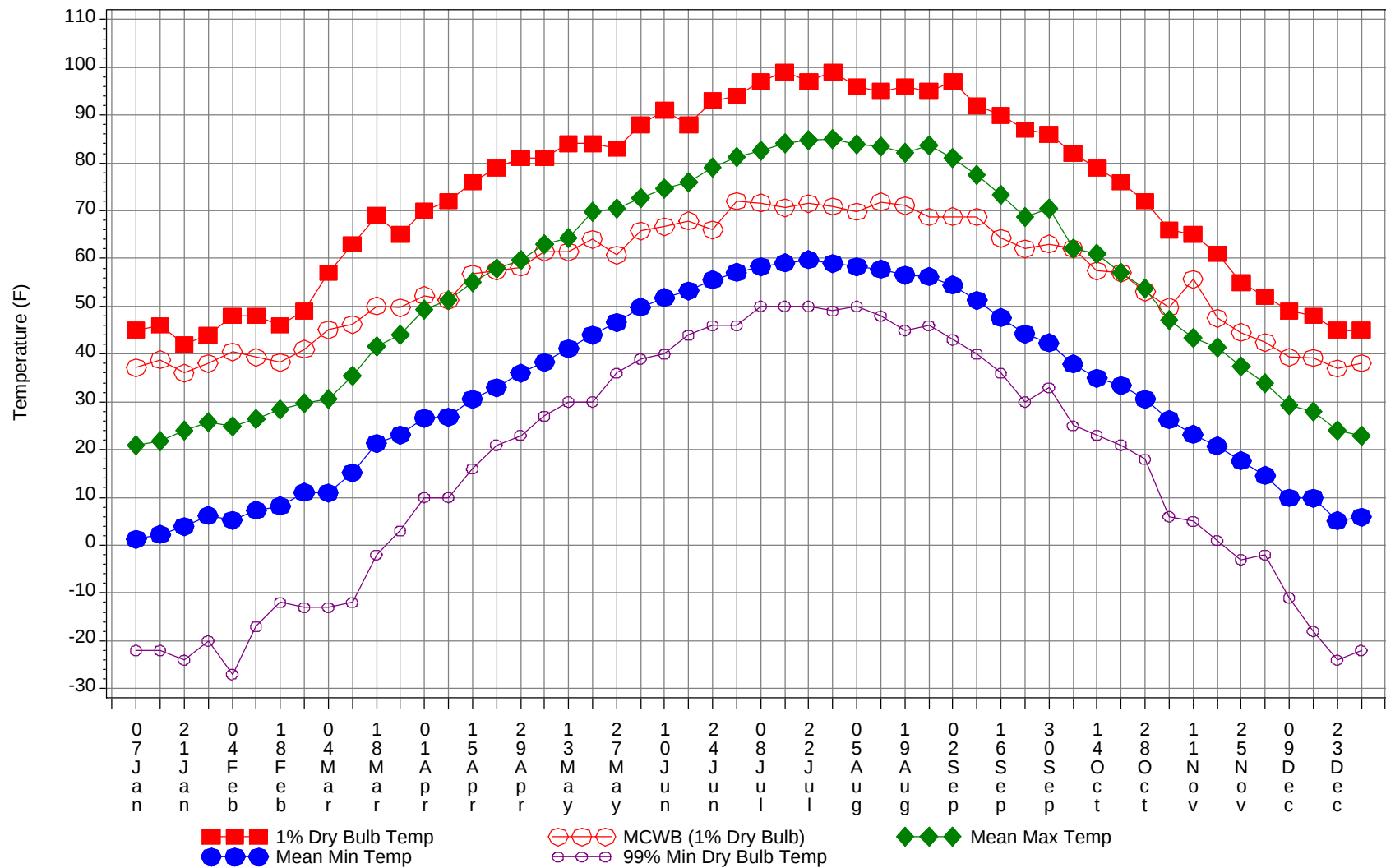
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary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

Dry-Bulb Temperature Hours For An Average Year

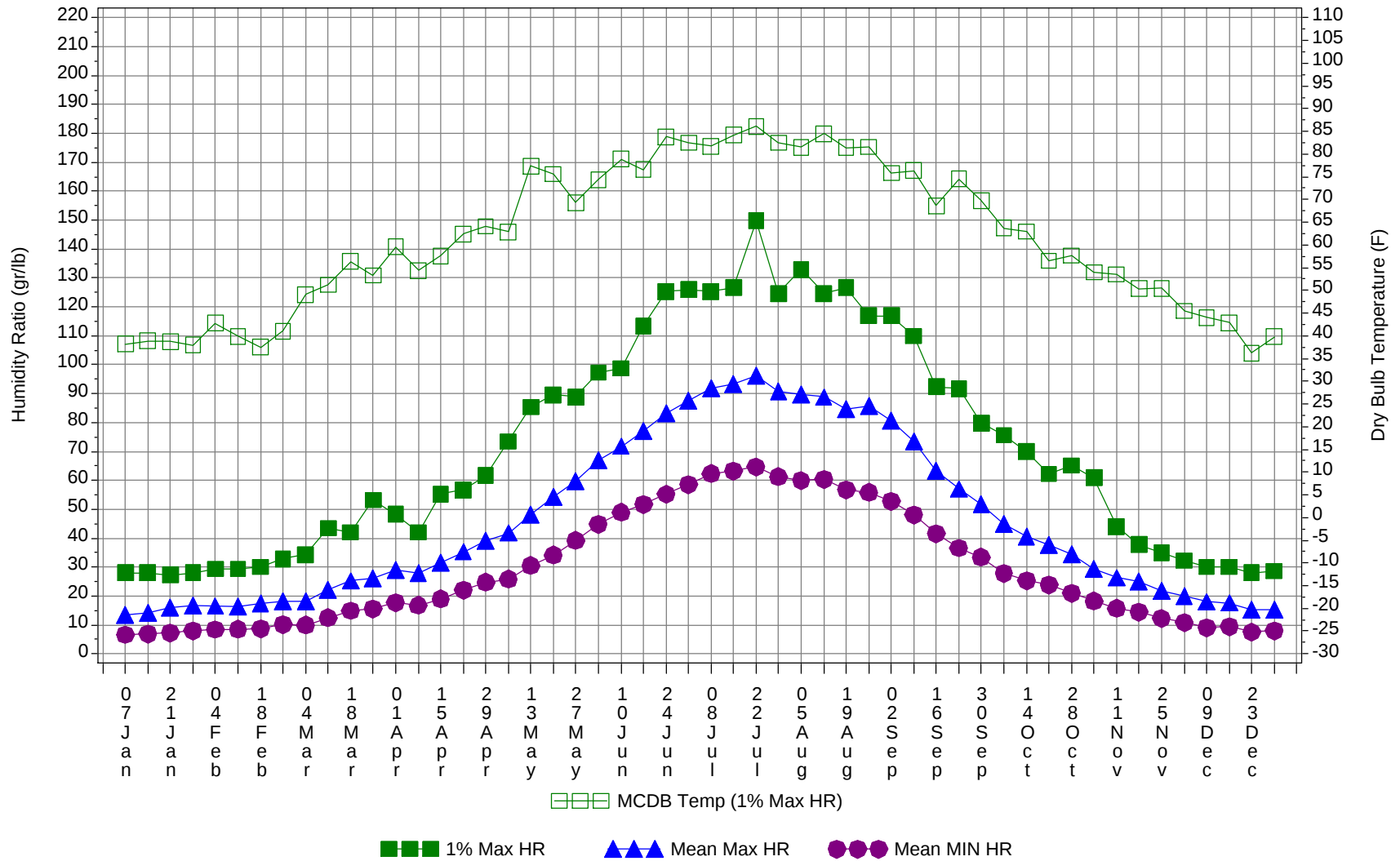
	Annual				
Temperature Range (° F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (° F)
110/114			0	0	70
105/109		1	0	1	71.4
100/104		4	2	6	70.8
95/ 99		15	8	23	70.4
90/ 94	0	53	26	79	69.4
85/ 89	0	77	44	121	67.8
80/ 84	3	179	104	286	65.6
75/ 79	17	206	143	366	63.2
70/ 74	76	247	199	522	60.9
65/ 69	121	169	171	461	58.5
60/ 64	259	216	244	719	55.5
55/ 59	256	174	200	630	51
50/ 54	239	176	192	607	46.7
45/ 49	226	180	193	599	41.8
40/ 44	156	132	143	431	37.7
35/ 39	243	201	224	668	33.9
30/ 34	274	182	225	681	29.7
25/ 29	267	171	205	643	25
20/ 24	155	102	115	372	20.5
15/ 19	178	124	136	438	16.2
10/ 14	111	91	91	293	10.8
5/ 9	94	70	75	239	6.2
0/ 4	82	63	73	218	0.9
-5/ -1	40	30	36	106	-3.5
-10/ -6	55	31	40	126	-7.9
-15/-11	27	13	13	53	-12.5
-20/-16	21	9	13	43	-16.8
-25/-21	11	3	5	19	-21.9
-30/-26	4	1	1	6	-26.8
-35/-31	2	0	0	2	-31.9
-40/-36	1	0		1	-36.4
-45/-41	0			0	-40

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Annual Summary of Temperatures



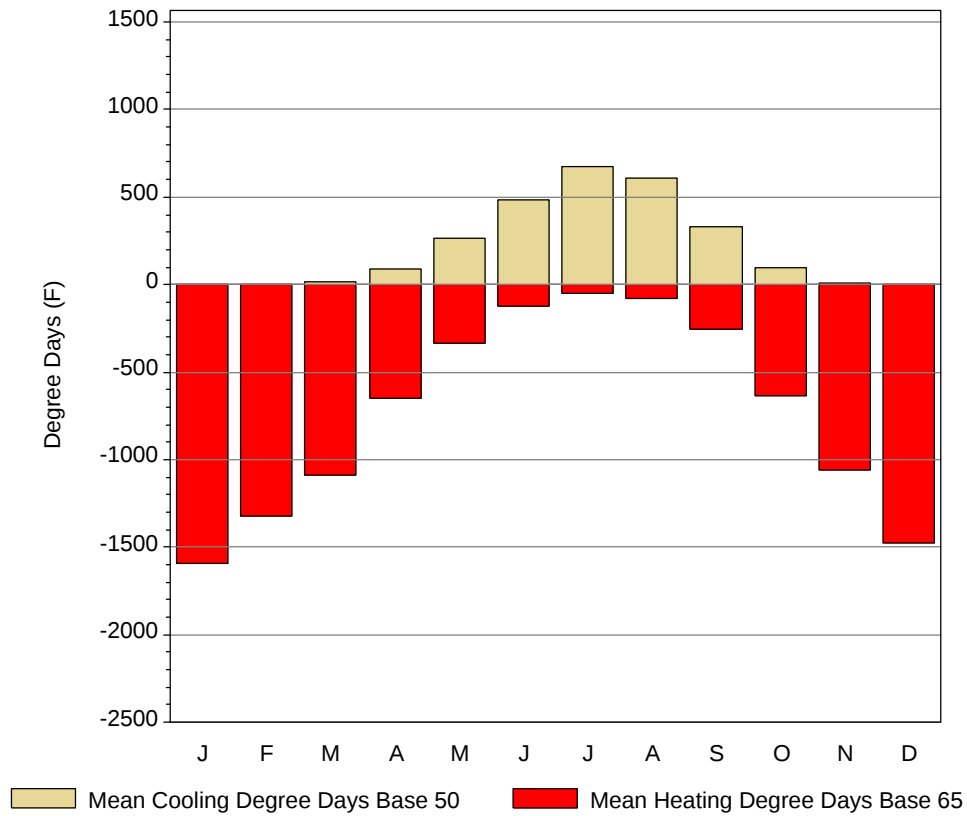
Long Term Humidity and Dry Bulb Temperature Summary



Long Term Humidity and Dry Bulb Temperature Summary

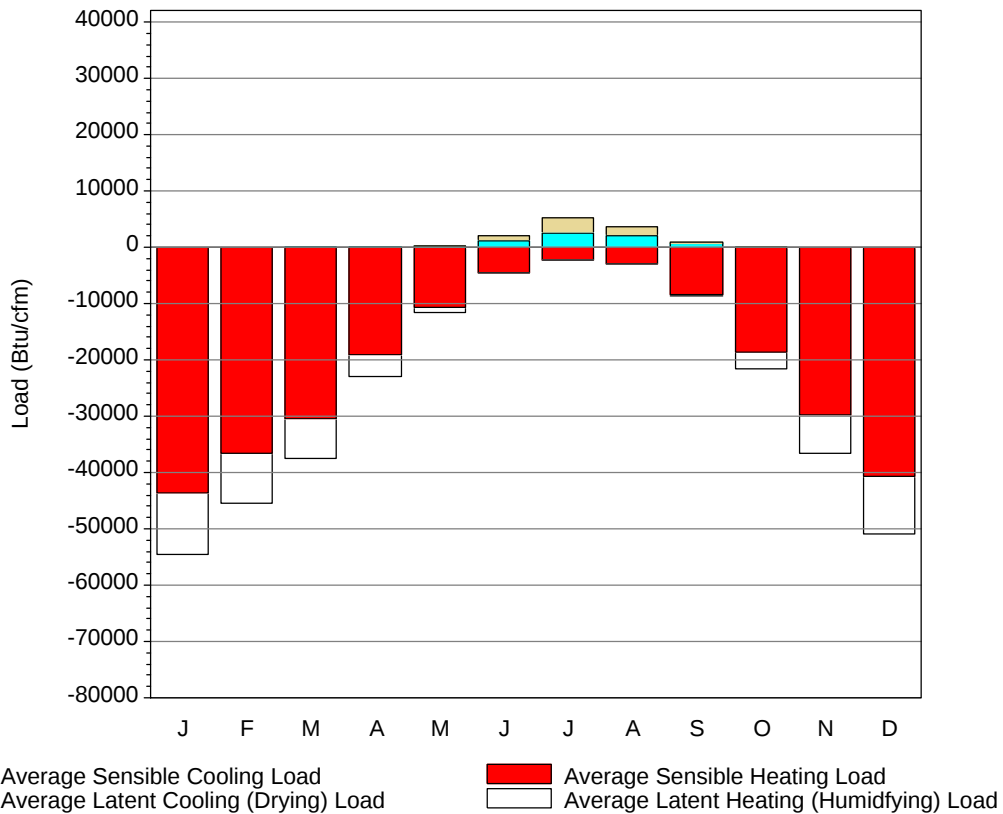
Week Ending	1.0% Temp (° F)	MCWB@ 1% Temp (° F)	Mean Max Temp (° F)	Mean Min Temp (° F)	99% Temp (° F)	1.0% HR (gr/lb)	MCDB@ 1% HR (° F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	45	37.2	21	1.3	-22	28	38.2	13.6	6.6
14-Jan	46	38.8	21.8	2.3	-22	28	38.9	14.3	6.8
21-Jan	42	36	24.1	3.9	-24	27.3	38.7	16	7.2
28-Jan	44	38	25.7	6.2	-20	28	38	16.7	8
4-Feb	48	40.5	24.8	5.2	-27	29.4	42.8	16.5	8.4
11-Feb	48	39.3	26.5	7.3	-17	29.4	39.9	16.3	8.5
18-Feb	46	38.3	28.3	8.2	-12	30.1	37.5	17.5	8.7
25-Feb	49	41	29.7	11.1	-13	32.9	41	18.2	10.1
4-Mar	57	45.1	30.7	10.9	-13	34.3	49.1	18.2	9.9
11-Mar	63	46.2	35.4	15.1	-12	43.4	51.2	22.1	12.4
18-Mar	69	50	41.6	21.3	-2	42	56.4	25.2	14.9
25-Mar	65	49.7	44.1	23.1	3	53.2	53.3	26	15.6
1-Apr	70	52.2	49.3	26.6	10	48.3	59.6	28.9	17.7
8-Apr	72	51.2	51.2	26.8	10	42	54.4	27.9	16.8
15-Apr	76	56.8	55.1	30.5	16	55.3	57.6	31.5	19
22-Apr	79	57.4	57.9	33	21	56.7	62.4	35.3	22.1
29-Apr	81	58.2	59.7	36	23	61.6	64.1	39	24.7
6-May	81	61.4	62.9	38.3	27	73.5	62.9	41.8	25.8
13-May	84	61.4	64.3	41.1	30	85.4	77.4	48.2	30.5
20-May	84	64	69.9	44	30	89.6	75.6	54.4	34.2
27-May	83	60.7	70.4	46.6	36	88.9	69.3	59.8	39.2
4-Jun	88	65.8	72.6	49.8	39	97.3	74.4	67	44.8
10-Jun	91	66.7	74.7	51.8	40	98.7	78.9	71.8	48.9
17-Jun	88	67.9	75.9	53.2	44	113.4	76.6	77.2	51.6
24-Jun	93	66	79	55.5	46	125.3	83.8	83.2	55.2
1-Jul	94	72	81.3	57.1	46	126	82.5	87.5	58.6
8-Jul	97	71.6	82.5	58.3	50	125.3	81.7	91.9	62.3
15-Jul	99	70.6	84.1	59.1	50	126.7	84.2	93.4	63.2
22-Jul	97	71.5	84.8	59.7	50	149.8	86.1	96.3	64.6
29-Jul	99	70.9	84.9	59	49	124.6	82.5	90.7	61.2
5-Aug	96	69.8	83.9	58.3	50	133	81.5	89.7	59.9
12-Aug	95	71.8	83.5	57.7	48	124.6	84.5	88.8	60.3
19-Aug	96	71.1	82.1	56.5	45	126.7	81.4	84.7	56.7
26-Aug	95	68.7	83.6	56.2	46	116.9	81.6	85.7	55.9
2-Sep	97	68.8	81	54.4	43	116.9	75.8	80.8	52.7
9-Sep	92	68.7	77.5	51.2	40	109.9	76.4	73.5	48
16-Sep	90	64.2	73.4	47.6	36	92.4	68.6	63.4	41.6
23-Sep	87	62	68.6	44.2	30	91.7	74.5	57	36.6
30-Sep	86	63	70.5	42.3	33	79.8	69.8	51.7	33.5
7-Oct	82	62	62	37.9	25	75.6	63.7	45	27.8
14-Oct	79	57.4	60.9	35	23	70	63	40.7	25.3
21-Oct	76	57	57.1	33.4	21	62.3	56.5	37.7	23.9
28-Oct	72	53	53.7	30.5	18	65.1	57.7	34.3	20.9
4-Nov	66	49.8	47.1	26.3	6	60.9	54	29.3	18.3
11-Nov	65	55.7	43.3	23.2	5	44.1	53.5	26.3	15.7
18-Nov	61	47.5	41.4	20.8	1	37.8	50.4	25	14.4
25-Nov	55	44.5	37.4	17.7	-3	35	50.5	21.9	12.2
2-Dec	52	42.4	33.8	14.6	-2	32.2	45.5	20.1	10.8
9-Dec	49	39.3	29.3	9.9	-11	30.1	44	18	9
16-Dec	48	39.2	28	9.8	-18	30.1	42.9	17.6	9.4
23-Dec	45	37	24.1	5.1	-24	28	36.2	15.3	7.5
31-Dec	45	38.1	22.8	5.9	-22	28.7	39.8	15.4	8

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	0.2	0	1591.8
FEB	1.3	0	1322.8
MAR	19.4	1.5	1085.6
APR	90.6	13.7	650.1
MAY	261.9	55.3	333.9
JUN	481.7	147.1	122.6
JUL	673.3	260.6	53.2
AUG	611.9	221.1	77.4
SEP	327.5	87.6	254.1
OCT	93.9	14.7	63.4
NOV	10.8	0.5	1055.6
DEC	0.5	0	1476.3
ANN	2573	802.1	8657.4

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	0	-43671	0	-10830
FEB	0	-36485	0	-9044
MAR	2	-30527	0	-6981
APR	56	-19048	0	-3947
MAY	261	-10571	73	-1064
JUN	1093	-4481	920	-24
JUL	2459	-2228	2835	-3
AUG	1994	-3033	1742	-13
SEP	644	-8276	305	-363
OCT	66	-18703	4	-2874
NOV	0	-29687	0	-6839
DEC	0	-40677	0	-10115
ANN	6575	-247387	5879	-52097

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	BISMARCK, ND 24011	Window:	1.000
Lat, Lon, Elev	46.77N 100.75W 1647ft	Overhang:	0.729
Press, Stn_Type	13.9psia Primary	Vert Gap:	0.328

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	530	820	1200	1550	1880	2090	2140	1830	1340	900	540	430	1270
	Std.Dev.	40	71	98	179	157	148	95	122	119	75	43	31	29
	Minimum	430	640	940	1130	1480	1820	1950	1530	1050	750	440	380	1220
	Maximum	600	950	1390	1930	2170	2380	2390	2010	1540	1060	640	480	1340
	Diffuse	280	430	580	680	770	780	710	620	480	360	270	240	520
Clear Day	Global	650	1020	1560	2120	2520	2680	2580	2220	1700	1130	710	550	1620
NORTH	Global	170	250	350	440	560	650	610	470	340	250	170	140	370
	Diffuse	170	250	350	420	500	530	510	440	340	250	170	140	340
Clear Day	Global	140	200	290	400	600	720	650	460	310	220	150	120	360
EAST	Global	390	560	790	980	1130	1200	1250	1110	870	630	380	310	800
	Diffuse	220	320	440	520	600	630	620	550	420	310	210	180	420
Clear Day	Global	580	830	1150	1410	1560	1610	1570	1430	1180	870	610	490	1110
SOUTH	Global	1070	1210	1260	1140	1030	980	1060	1180	1250	1230	980	930	1110
	Diffuse	360	460	540	560	590	600	590	550	480	400	330	310	480
Clear Day	Global	1830	2040	1990	1650	1320	1170	1210	1460	1790	1930	1820	1710	1660
WEST	Global	400	570	780	950	1100	1210	1260	1120	870	620	400	330	800
	Diffuse	220	320	440	530	610	640	620	550	430	310	220	180	420
Clear Day	Global	580	830	1150	1410	1560	1610	1570	1430	1180	870	610	490	1110

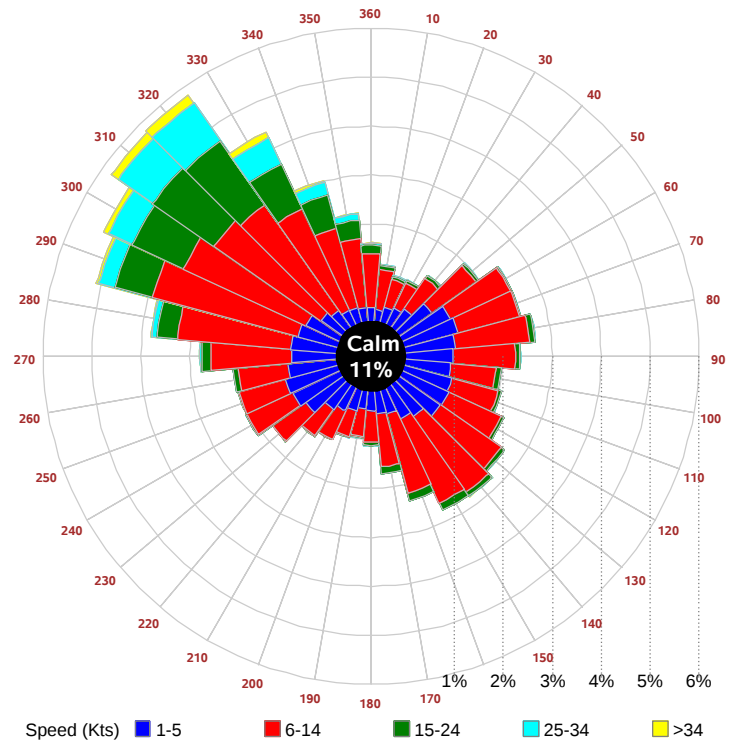
Average Annual Solar Radiation - Nearest Available Site Source: National Renewable Energy Laboratory, Golden CO, 1995

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	320	540	830	1100	1360	1510	1560	1320	940	600	340	250	890
NORTH	Unshaded	120	170	240	300	370	420	400	310	230	170	120	98	250
	Shaded	96	140	200	250	310	360	340	270	200	140	97	80	210
EAST	Unshaded	260	390	560	700	810	860	890	800	620	440	260	210	570
	Shaded	230	320	450	560	630	670	700	640	510	370	220	180	460
SOUTH	Unshaded	820	900	900	770	660	610	660	780	870	910	740	710	780
	Shaded	790	810	660	430	340	350	350	370	560	770	710	690	570
WEST	Unshaded	270	400	550	680	790	860	900	800	620	440	280	230	570
	Shaded	230	340	450	540	620	680	710	640	500	360	230	190	460

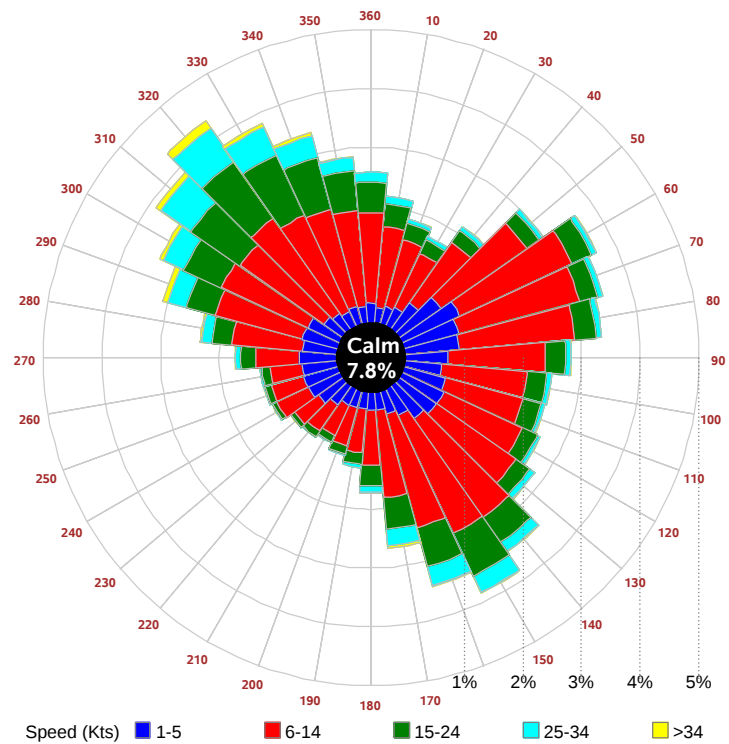
AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS Percentage Uncertainty = 9												
		March					June					
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	23	58	74	66	36	38	74	95	97	79	
	M.Cloudy	15	40	53	47	25	24	50	67	71	57	
NORTH	M.Clear	7	12	14	13	9	20	14	16	16	15	
	M.Cloudy	6	14	17	15	10	13	16	18	18	17	
EAST	M.Clear	64	68	24	13	9	76	81	47	16	15	
	M.Cloudy	23	36	21	15	10	33	47	35	18	17	
SOUTH	M.Clear	27	71	92	82	45	10	31	55	57	38	
	M.Cloudy	12	38	53	46	22	9	24	40	43	29	
WEST	M.Clear	7	12	14	55	73	10	14	16	36	75	
	M.Cloudy	6	14	17	34	33	9	16	18	30	50	
M.Clear	(% hrs)	30	28	25	25	27	40	39	38	34	35	

		Sept					Dec					
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	14	51	75	76	54	1	23	35	26	3	
	M.Cloudy	8	31	48	49	36	1	16	25	18	3	
NORTH	M.Clear	5	11	14	14	12	1	7	9	8	2	
	M.Cloudy	4	11	15	15	12	0	7	10	8	2	
EAST	M.Clear	48	75	43	14	12	4	40	12	8	2	
	M.Cloudy	15	35	28	15	12	1	16	11	8	2	
SOUTH	M.Clear	10	51	79	81	55	3	63	87	69	13	
	M.Cloudy	5	26	44	46	31	1	23	36	28	4	
WEST	M.Clear	5	11	14	36	72	1	7	9	38	15	
	M.Cloudy	4	11	15	25	38	0	7	10	18	5	
M.Clear	(% hrs)	45	44	43	43	42	29	30	29	32	34	

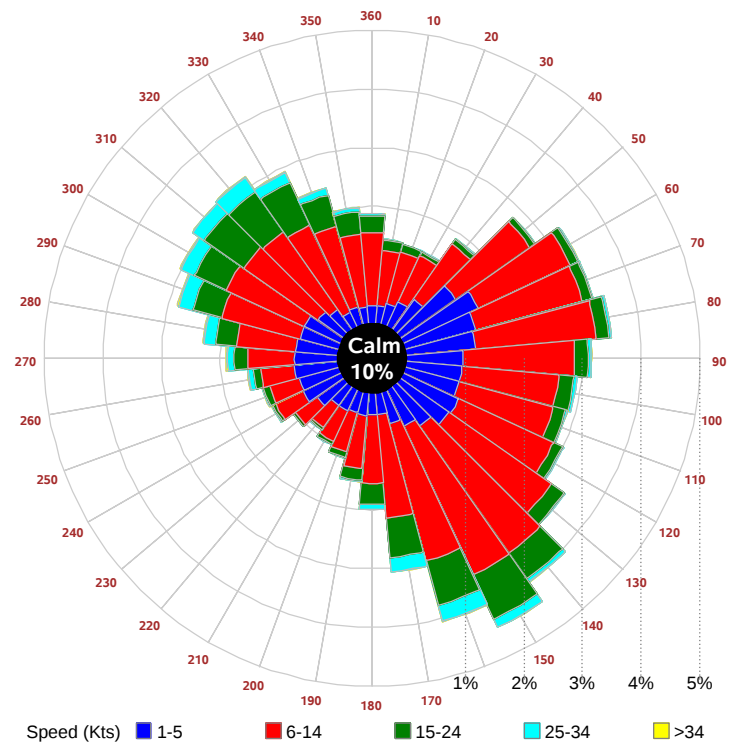
Wind Summary - December, January, and February



Wind Summary - March, April, and May



Wind Summary - June, July, and August



Wind Summary - September, October, and November

