WINNIPEG CN	
Latitude = 49.90 N	WMO No. 718520
Longitude = 97.23 W	Elevation = 784 feet
Period of Record = 1973 to 1996	Average Pressure = 29.10 inches Hg

Design Criteria Data

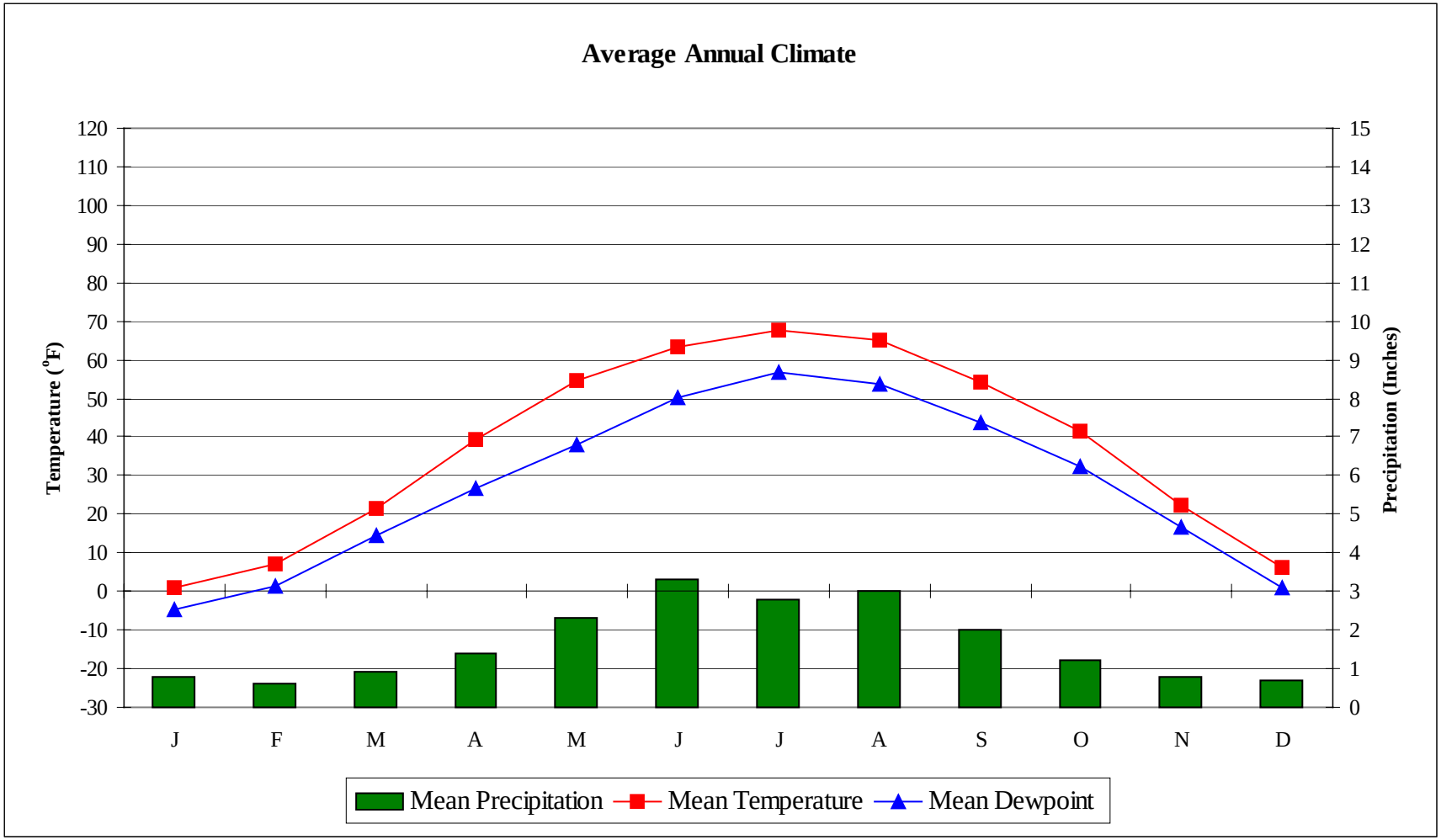
		Mean Coincident (Average) Values			
Dry Bulb Temperature (T)	**Design Value (^oF)**	Wet Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	94	71	80	15.4	S
0.4% Occurrence	88	69	77	13.3	S
1.0% Occurrence	84	68	80	12.8	S
2.0% Occurrence	81	66	76	11.7	S
Mean Daily Range	19	-	-	-	-
97.5% Occurrence	-18	-18	1	8.2	W
99.0% Occurrence	-22	-22	1	7.6	W
99.6% Occurrence	-26	-26	1	6.9	W
Median of Extreme Lows	-31	-31	1	6.9	W
		Mean Coincident (Average) Values			
Wet Bulb Temperature (T_{wb})	**Design Value (^oF)**	Dry Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	76	86	120	13.9	S
0.4% Occurrence	73	83	108	11.7	S
1.0% Occurrence	70	80	96	11.2	S
2.0% Occurrence	68	77	90	10.8	S
		Mean Coincident (Average) Values			
Humidity Ratio (HR)	**Design Value (gr/lb)**	Dry Bulb Temperature (^oF)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	128	81	0.83	10.5	S
0.4% Occurrence	111	79	0.72	11.5	S
1.0% Occurrence	100	75	0.65	10.3	S
2.0% Occurrence	94	74	0.61	10.0	S
Air Conditioning/		$T \geq 93^oF$	$T \geq 80^oF$	$T_{wb} \geq 73^oF$	$T_{wb} \geq 67^oF$
Humid Area Criteria	# of Hours	8	226	36	282

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
4	N/A	N/A	0.3 + 0.2
Ground Water Temperature (^oF) 50 Foot Depth *	**Frost Depth 50 Year Recurrence (in.)**	**Ground Snow Load 50 Year Recurrence (lb/ft^2)**	**Average Annual Freeze-Thaw Cycles (#)**
39.6	N/A	N/A	54

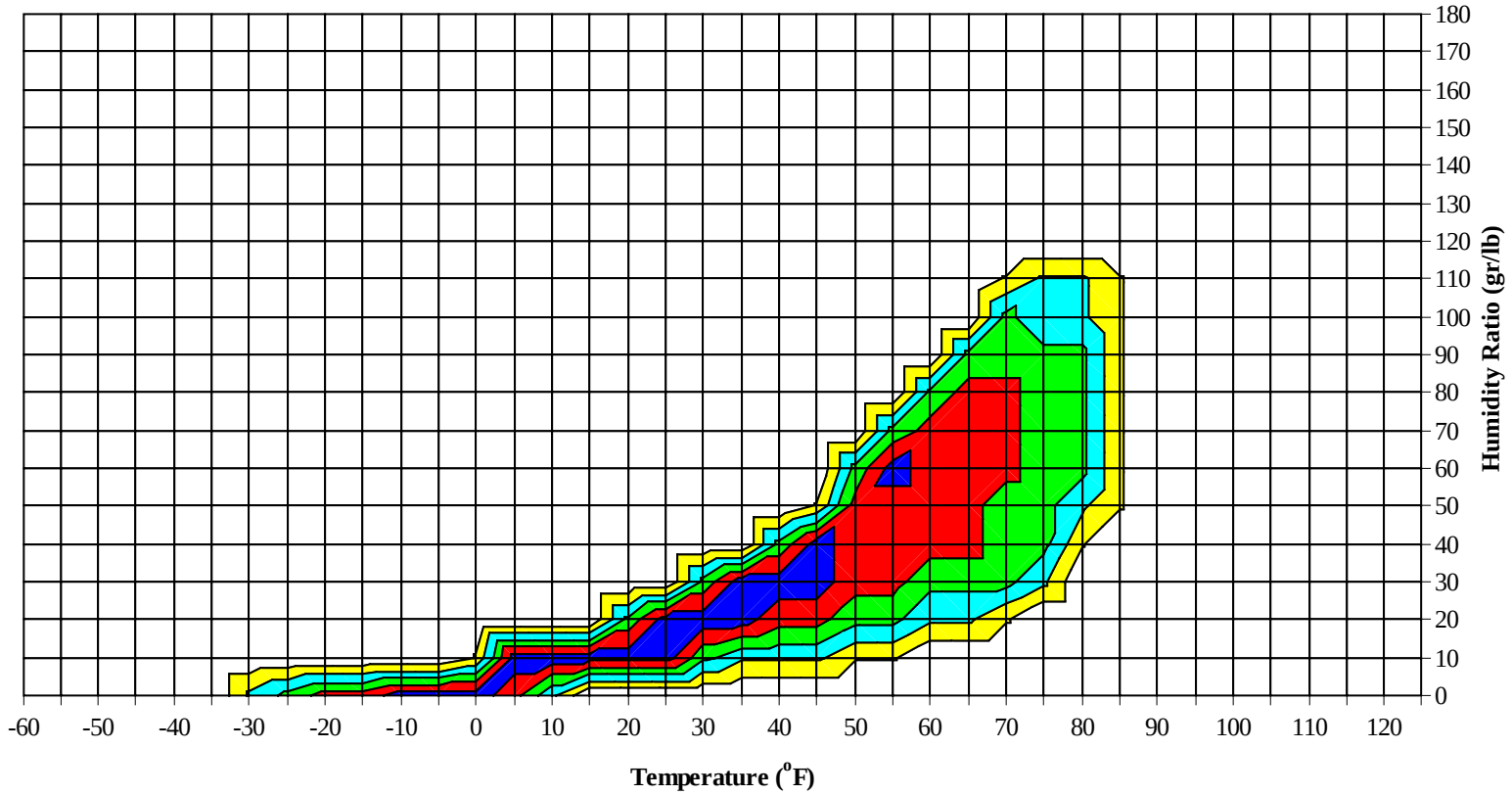
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

WINNIPEG CN WMO No. 718520



WINNIPEG CN WMO No. 718520

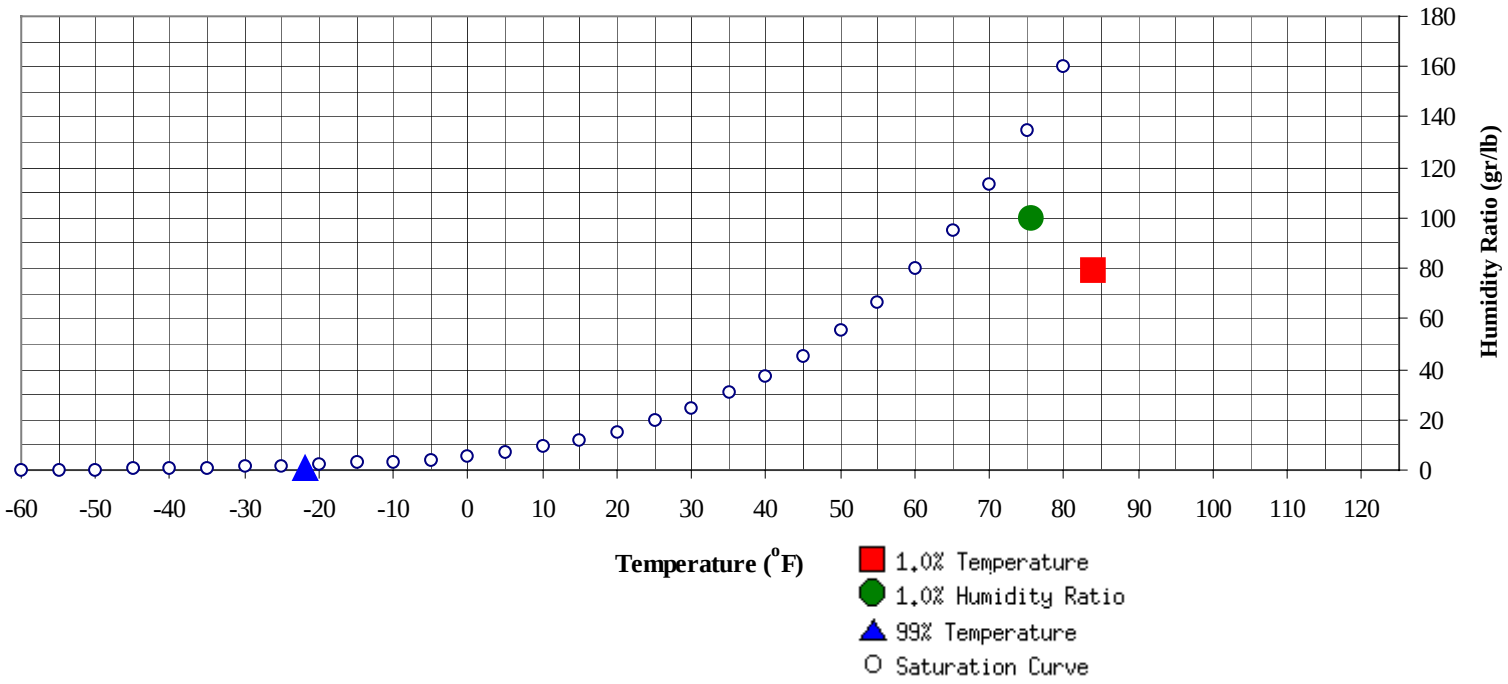
Long Term Psychrometric Summary



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

WINNIPEG CN WMO No. 718520

Psychrometric Summary of Peak Design Values



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
99% Dry Bulb	-22	1.1	-5.1

	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
1.0% Humidity Ratio	100.1	75.5	69.1	66.2	33.8

	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
1.0% Dry Bulb	84	79.6	68	32.6

WINNIPEG CN WMO No. 718520

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

Period of Record = 1973 to 1996

Temperature Range (°F)	January Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	February Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	March Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
100 / 104															
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74															
65 / 69															
60 / 64															
55 / 59												1	0	1	46.0
50 / 54												4	1	5	43.5
45 / 49							0		0	40.0	1	8	4	13	40.4
40 / 44		1	0	1	36.4		2	1	3	36.6	2	11	9	22	37.4
35 / 39	2	2	1	5	33.9	3	7	7	17	33.9	17	39	35	91	34.2
30 / 34	3	6	6	15	30.0	10	15	15	40	30.4	43	41	47	132	30.5
25 / 29	9	15	15	39	25.1	16	21	20	57	25.4	34	32	34	100	24.9
20 / 24	13	14	14	41	21.1	15	15	15	45	21.0	24	22	21	67	20.5
15 / 19	21	22	23	66	16.5	25	25	21	71	16.3	28	27	28	83	15.9
10 / 14	26	26	25	77	11.3	23	26	26	75	11.1	25	22	22	69	10.9
5 / 9	23	26	25	74	6.1	20	27	29	76	5.9	22	17	17	56	5.8
0 / 4	27	29	25	81	0.6	22	24	25	71	0.6	20	11	13	44	0.7
-5 / -1	19	20	22	61	-3.7	16	16	16	48	-3.7	10	6	7	23	-3.6
-10 / -6	24	25	30	79	-8.0	24	20	18	62	-7.9	9	4	6	19	-7.8
-15 / -11	17	19	17	53	-12.5	14	9	10	33	-12.5	7	2	2	11	-12.3
-20 / -16	22	22	24	68	-17.0	17	8	12	37	-16.9	5	1	1	7	-16.7
-25 / -21	25	14	17	56	-22.1	13	4	7	24	-21.9	3	0	0	3	-21.9
-30 / -26	13	5	6	24	-27.0	5	2	1	8	-26.9	0			0	-26.0
-35 / -31	4	1	1	6	-31.5	1	0	0	1	-31.7					
-40 / -36	1	0	0	1	-35.2	1	0	0	1	-36.8					
-45 / -41						0	0		0	-40.8					

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.

WINNIPEG CN WMO No. 718520

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

Period of Record = 1973 to 1996

Temperature Range (°F)	April					May					June				
	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB
	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)
100 / 104															
95 / 99							0	0	0	62.7		1	1	2	71.7
90 / 94		0	0	0	59.4		3	1	4	65.0		3	2	5	70.2
85 / 89		0	0	0	60.2		5	2	7	64.1		5	3	8	68.3
80 / 84		1	1	2	58.5	0	10	6	16	62.2	0	19	9	28	66.8
75 / 79		4	1	5	56.4	1	20	11	32	59.4	3	37	22	62	63.4
70 / 74		6	3	9	53.8	4	30	19	53	56.8	10	50	38	98	60.8
65 / 69	0	6	3	9	51.5	5	25	21	51	54.6	19	38	36	93	58.6
60 / 64	1	15	9	25	49.2	20	39	34	93	52.0	52	44	50	146	56.2
55 / 59	4	23	15	42	46.2	31	38	40	109	49.2	60	26	41	127	52.9
50 / 54	8	31	25	64	43.1	44	32	37	113	45.7	50	11	24	85	48.7
45 / 49	20	37	32	89	40.0	46	22	32	100	41.8	28	3	10	41	44.1
40 / 44	21	24	27	72	36.8	27	11	17	55	38.1	11	1	3	15	40.0
35 / 39	46	36	40	122	33.6	29	8	16	53	34.5	6	0	1	7	36.4
30 / 34	54	29	39	122	29.7	24	3	9	36	30.0	1			1	31.7
25 / 29	43	14	24	81	24.9	12	0	4	16	25.3					
20 / 24	18	5	8	31	20.5	2		0	2	20.6					
15 / 19	13	4	7	24	16.0	1			1	16.4					
10 / 14	6	2	3	11	11.1	0			0	12.0					
5 / 9	2	1	1	4	6.3										
0 / 4	2	1	1	4	1.3										
-5 / -1	1	0	0	1	-3.7										
-10 / -6	1		0	1	-7.9										
-15 / -11	0			0	-12.4										
-20 / -16	0			0	-15.0										
-25 / -21															
-30 / -26															
-35 / -31															
-40 / -36															
-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.

WINNIPEG CN WMO No. 718520

Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	July Hour Group (LST) 01 To 08	July 09 To 16	July 17 To 00	July Total Obs	July MCWB (°F)	August Hour Group (LST) 01 To 08	August 09 To 16	August 17 To 00	August Total Obs	August MCWB (°F)	September Hour Group (LST) 01 To 08	September 09 To 16	September 17 To 00	September Total Obs	September MCWB (°F)
100 / 104							0		0	75.0					
95 / 99		0		0	78.0		1	1	2	71.6		0	0	0	72.4
90 / 94		4	1	5	73.3		5	2	7	69.4		1	0	1	68.4
85 / 89		10	5	15	70.5		10	4	14	68.6		1	1	2	68.7
80 / 84	0	36	19	55	68.3	0	29	14	43	67.2		6	2	8	64.6
75 / 79	4	65	39	108	65.4	2	45	28	75	65.0	0	13	6	19	62.1
70 / 74	21	68	55	144	63.2	14	58	42	114	62.5	3	24	12	39	59.7
65 / 69	38	34	46	118	61.2	26	37	38	101	60.5	3	24	15	42	57.3
60 / 64	77	24	51	152	58.7	63	39	52	154	57.7	15	45	34	94	54.9
55 / 59	67	5	25	97	54.7	66	17	39	122	53.9	31	50	47	129	51.5
50 / 54	32	1	7	40	50.7	46	6	19	71	50.0	53	40	49	143	48.0
45 / 49	8		1	9	45.9	23	0	7	30	45.2	58	21	38	117	43.6
40 / 44	1			1	41.3	6		1	7	40.8	32	9	17	58	39.6
35 / 39						2		0	2	36.3	28	4	14	46	35.9
30 / 34											13	0	5	18	31.0
25 / 29											3		0	3	26.8
20 / 24															
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															

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.

WINNIPEG CN WMO No. 718520

Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	October Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	November Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	December Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
100 / 104															
95 / 99															
90 / 94															
85 / 89		0		0	64.0										
80 / 84		0	0	0	60.1										
75 / 79		1	0	1	58.7										
70 / 74		4	1	5	56.3										
65 / 69	0	6	2	8	54.9										
60 / 64	1	15	7	23	52.3		1	0	1	48.4					
55 / 59	6	28	18	52	49.3		2	1	3	46.8					
50 / 54	13	38	29	80	45.5	1	6	3	10	44.6					
45 / 49	32	50	43	125	42.0	4	10	7	21	40.9		0		0	42.3
40 / 44	36	35	39	110	38.4	5	11	9	25	37.4		1	0	1	37.9
35 / 39	56	39	49	144	34.6	14	25	21	60	33.8	1	2	2	5	34.1
30 / 34	55	19	34	108	30.2	36	41	40	117	29.9	8	13	12	33	30.2
25 / 29	28	8	16	52	25.3	45	39	43	127	25.2	20	22	24	66	25.1
20 / 24	12	1	6	19	21.0	26	25	24	75	20.9	18	22	20	60	21.1
15 / 19	6	2	3	11	16.6	34	28	28	90	16.5	30	30	31	91	16.5
10 / 14	2	1	2	5	11.5	25	19	23	67	11.3	31	28	27	86	11.4
5 / 9	1	0	0	1	6.1	16	13	16	45	6.1	27	26	27	80	6.1
0 / 4	0			0	3.0	13	10	12	35	0.9	20	26	21	67	0.7
-5 / -1						6	4	4	14	-3.6	16	15	15	46	-3.7
-10 / -6						8	3	5	16	-7.7	24	26	23	73	-8.0
-15 / -11						3	1	2	6	-12.2	13	12	18	43	-12.4
-20 / -16						2	1	1	4	-16.7	21	14	16	51	-17.0
-25 / -21						1	0	1	2	-21.8	11	7	9	27	-21.9
-30 / -26						0		0	0	-26.6	6	2	3	11	-27.1
-35 / -31											2	0	0	2	-31.4
-40 / -36											0			0	-35.0
-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.

WINNIPEG CN WMO No. 718520

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

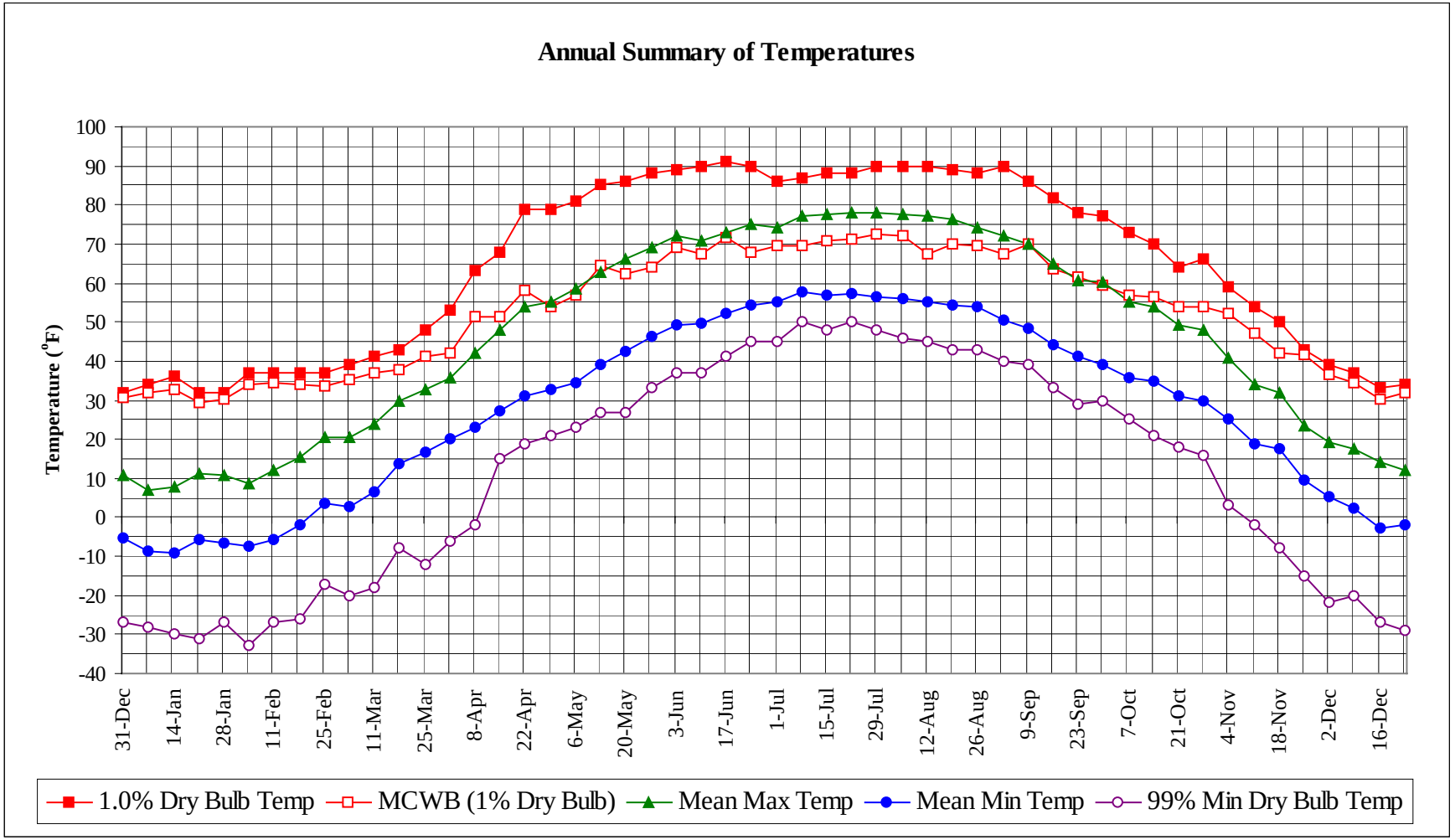
Period of Record = 1973 to 1996

Annual Totals

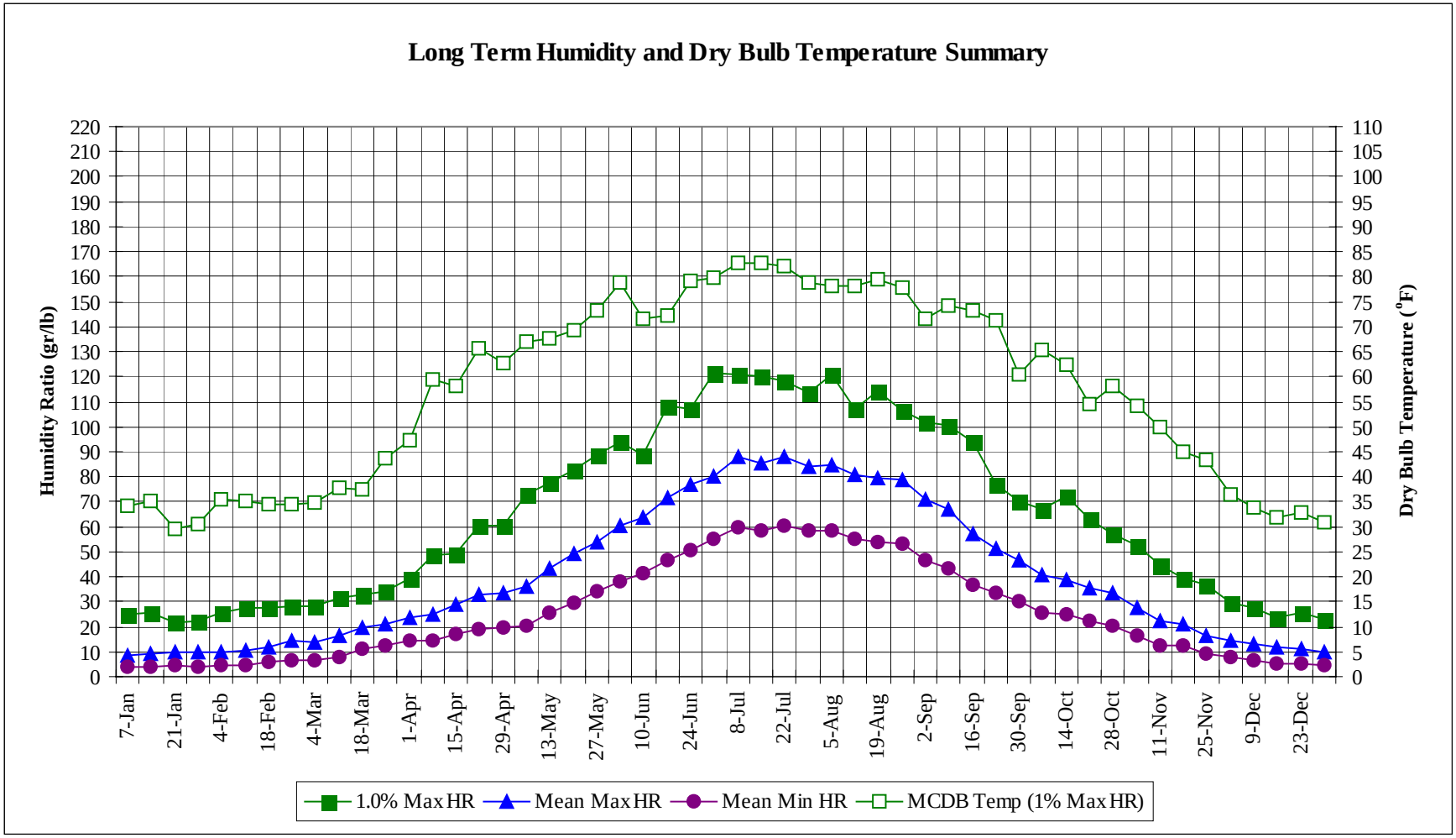
Temperature Range (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
100 / 104		0		0	75.0
95 / 99		3	1	4	71.1
90 / 94		15	6	21	69.6
85 / 89		32	15	47	68.4
80 / 84	1	101	52	154	66.7
75 / 79	9	186	108	302	63.9
70 / 74	51	241	169	461	61.2
65 / 69	92	170	160	422	58.9
60 / 64	230	224	236	690	56.0
55 / 59	265	189	226	680	51.8
50 / 54	245	168	194	607	47.1
45 / 49	220	153	172	545	42.3
40 / 44	142	106	124	372	38.2
35 / 39	205	164	185	554	34.3
30 / 34	249	170	205	624	30.1
25 / 29	210	152	179	541	25.1
20 / 24	129	105	109	343	20.8
15 / 19	159	140	141	440	16.3
10 / 14	137	125	128	389	11.2
5 / 9	112	109	116	337	6.0
0 / 4	104	101	98	303	0.7
-5 / -1	68	62	65	195	-3.7
-10 / -6	90	78	82	250	-7.9
-15 / -11	54	42	50	146	-12.5
-20 / -16	66	46	54	166	-17.0
-25 / -21	52	26	33	111	-22.0
-30 / -26	25	9	11	45	-27.0
-35 / -31	6	2	1	9	-31.5
-40 / -36	1	0	1	2	-36.0
-45 / -41	0	0		0	-40.8

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.

WINNIPEG CN WMO No. 718520



WINNIPEG CN WMO No. 718520

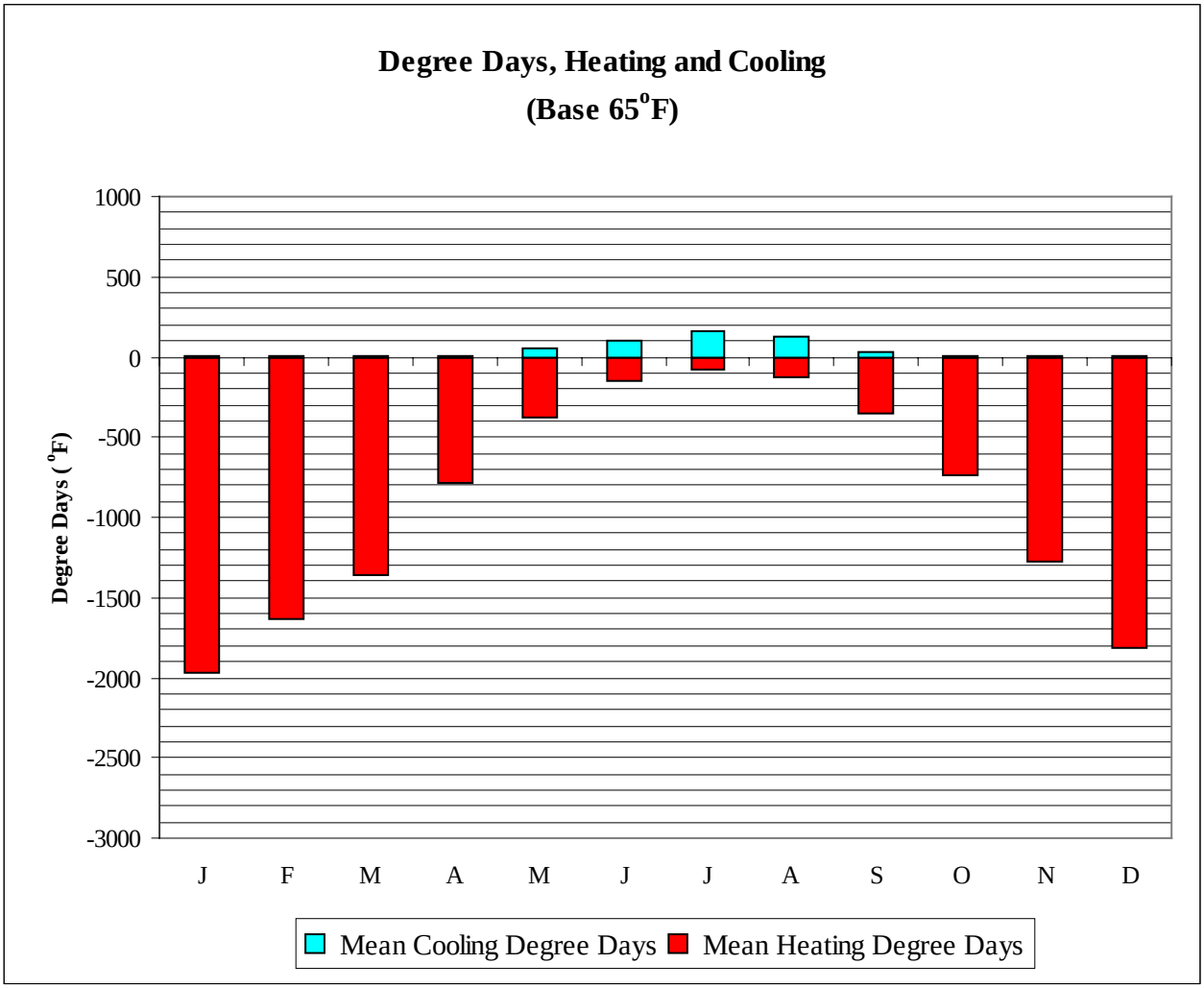


WINNIPEG CN WMO No. 718520

Long Term Dry Bulb Temperature and Humidity Summary

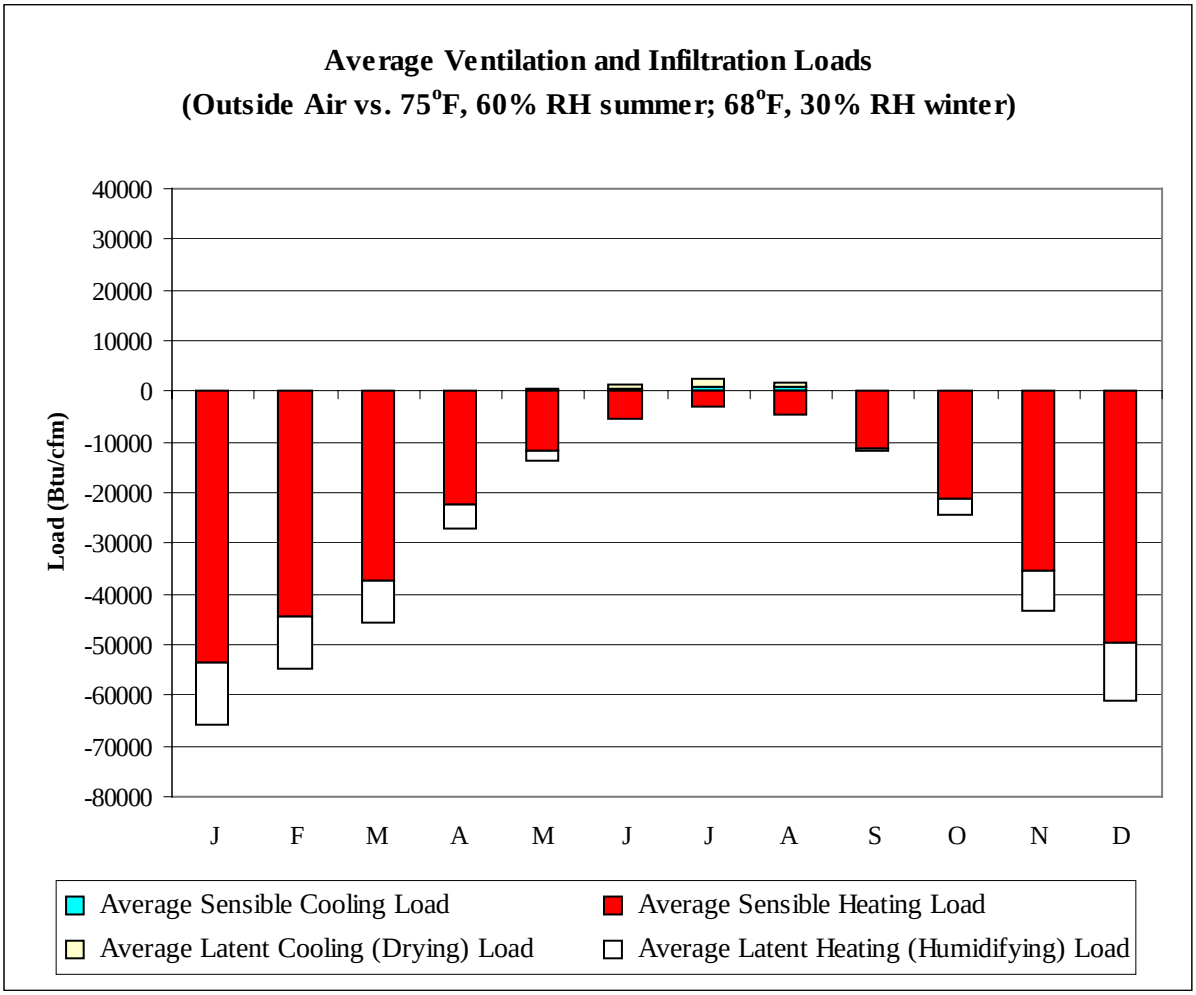
Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	34.0	31.8	6.9	-8.9	-28.0	25.2	34.3	8.5	3.7
14-Jan	36.0	32.8	7.8	-9.3	-30.0	25.9	35.0	9.0	3.9
21-Jan	32.0	29.4	11.2	-5.7	-31.0	21.7	29.5	10.1	4.5
28-Jan	32.0	30.1	10.9	-6.6	-27.0	22.4	30.4	9.7	4.0
4-Feb	37.0	34.0	8.6	-7.5	-33.0	25.9	35.4	9.6	4.5
11-Feb	37.0	34.6	12.0	-5.6	-27.0	27.3	35.1	10.4	4.6
18-Feb	37.0	34.1	15.3	-1.7	-26.0	27.3	34.4	11.8	5.6
25-Feb	37.0	33.8	20.4	3.6	-17.0	28.0	34.4	14.2	6.8
4-Mar	39.0	35.4	20.5	2.6	-20.0	28.0	35.0	14.0	6.4
11-Mar	41.0	36.9	24.0	6.5	-18.0	31.5	37.8	16.2	8.1
18-Mar	43.0	38.0	29.6	13.9	-8.0	32.9	37.3	19.8	10.9
25-Mar	48.0	41.1	32.8	16.8	-12.0	34.3	43.6	21.2	12.2
1-Apr	53.0	42.0	35.9	19.9	-6.0	39.2	47.3	23.6	14.3
8-Apr	63.0	51.4	42.1	23.0	-2.0	48.3	59.3	25.3	14.7
15-Apr	68.0	51.4	47.9	27.4	15.0	49.0	58.0	28.7	16.8
22-Apr	79.0	58.2	54.1	31.1	19.0	60.2	65.7	32.9	19.0
29-Apr	79.0	53.8	55.1	32.6	21.0	60.2	62.7	33.5	20.0
6-May	81.0	57.0	58.6	34.3	23.0	72.8	67.0	36.1	20.4
13-May	85.0	64.5	62.8	39.3	27.0	77.7	67.7	43.2	25.6
20-May	86.0	62.2	66.3	42.5	27.0	82.6	69.3	49.0	29.3
27-May	88.0	64.1	69.2	46.3	33.0	88.9	73.1	53.8	33.9
3-Jun	89.0	69.0	72.1	49.3	37.0	93.8	78.9	60.3	37.9
10-Jun	90.0	67.3	70.9	49.7	37.0	88.9	71.5	63.9	41.2
17-Jun	91.0	71.6	73.0	52.1	41.0	108.5	72.2	71.6	46.6
24-Jun	90.0	67.9	75.2	54.3	45.0	107.1	79.2	76.6	50.7
1-Jul	86.0	69.4	74.0	55.0	45.0	121.8	79.9	79.8	55.1
8-Jul	87.0	69.5	77.1	57.7	50.0	121.1	82.6	88.3	59.6
15-Jul	88.0	70.8	77.4	56.9	48.0	120.4	82.7	85.5	58.1
22-Jul	88.0	71.4	78.1	57.3	50.0	118.3	82.1	88.1	60.2
29-Jul	90.0	72.5	78.0	56.6	48.0	113.4	79.0	83.9	58.6
5-Aug	90.0	72.1	77.4	56.1	46.0	121.1	78.3	84.7	58.7
12-Aug	90.0	67.3	77.4	55.1	45.0	107.1	78.1	80.9	55.0
19-Aug	89.0	70.1	76.3	54.2	43.0	114.1	79.6	79.7	53.6
26-Aug	88.0	69.6	74.3	54.0	43.0	106.4	77.9	78.7	53.3
2-Sep	90.0	67.5	71.9	50.6	40.0	101.5	71.6	71.0	46.6
9-Sep	86.0	69.8	69.8	48.5	39.0	100.8	74.4	66.7	43.0
16-Sep	82.0	63.5	65.1	44.3	33.0	93.8	73.2	57.3	36.9
23-Sep	78.0	61.5	60.6	41.3	29.0	77.0	71.3	51.1	33.2
30-Sep	77.0	59.6	60.3	39.2	30.0	70.0	60.3	46.9	29.9
7-Oct	73.0	56.9	55.2	35.8	25.0	67.2	65.3	40.9	25.7
14-Oct	70.0	56.4	53.9	34.7	21.0	72.1	62.4	39.0	24.8
21-Oct	64.0	53.9	49.3	31.2	18.0	63.0	54.4	35.5	22.3
28-Oct	66.0	53.9	47.8	29.7	16.0	57.4	58.0	33.7	20.4
4-Nov	59.0	52.3	40.8	25.3	3.0	52.5	54.1	27.7	16.5
11-Nov	54.0	47.2	34.2	18.7	-2.0	44.8	50.0	22.1	12.8
18-Nov	50.0	41.9	32.0	17.6	-8.0	39.2	45.0	21.3	12.8
25-Nov	43.0	41.5	23.4	9.5	-15.0	37.1	43.4	16.7	9.1
2-Dec	39.0	36.8	19.3	5.3	-22.0	29.4	36.5	14.5	7.9
9-Dec	37.0	34.5	17.5	2.2	-20.0	27.3	33.9	13.1	6.4
16-Dec	33.0	30.2	14.2	-2.7	-27.0	23.8	31.7	11.6	5.1
23-Dec	34.0	32.0	12.1	-2.0	-29.0	25.9	32.9	10.9	5.6
31-Dec	32.0	30.8	10.6	-5.4	-27.0	23.1	31.0	10.2	4.7

WINNIPEG CN WMO No. 718520



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1967
FEB	0	1635
MAR	0	1356
APR	8	779
MAY	56	380
JUN	100	155
JUL	159	73
AUG	129	124
SEP	32	359
OCT	3	733
NOV	0	1274
DEC	0	1820
ANN	487	10655

WINNIPEG CN WMO No. 718520



	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	-53390	0	-12220
FEB	0	-44565	0	-10264
MAR	0	-37563	0	-8291
APR	37	-22443	0	-4637
MAY	336	-11790	66	-1704
JUN	559	-5487	630	-70
JUL	880	-2996	1629	0
AUG	798	-4592	1084	-18
SEP	148	-11344	132	-423
OCT	6	-21373	1	-2870
NOV	0	-35367	0	-7739
DEC	0	-49595	0	-11508
ANN	2764	-300505	3542	-59744

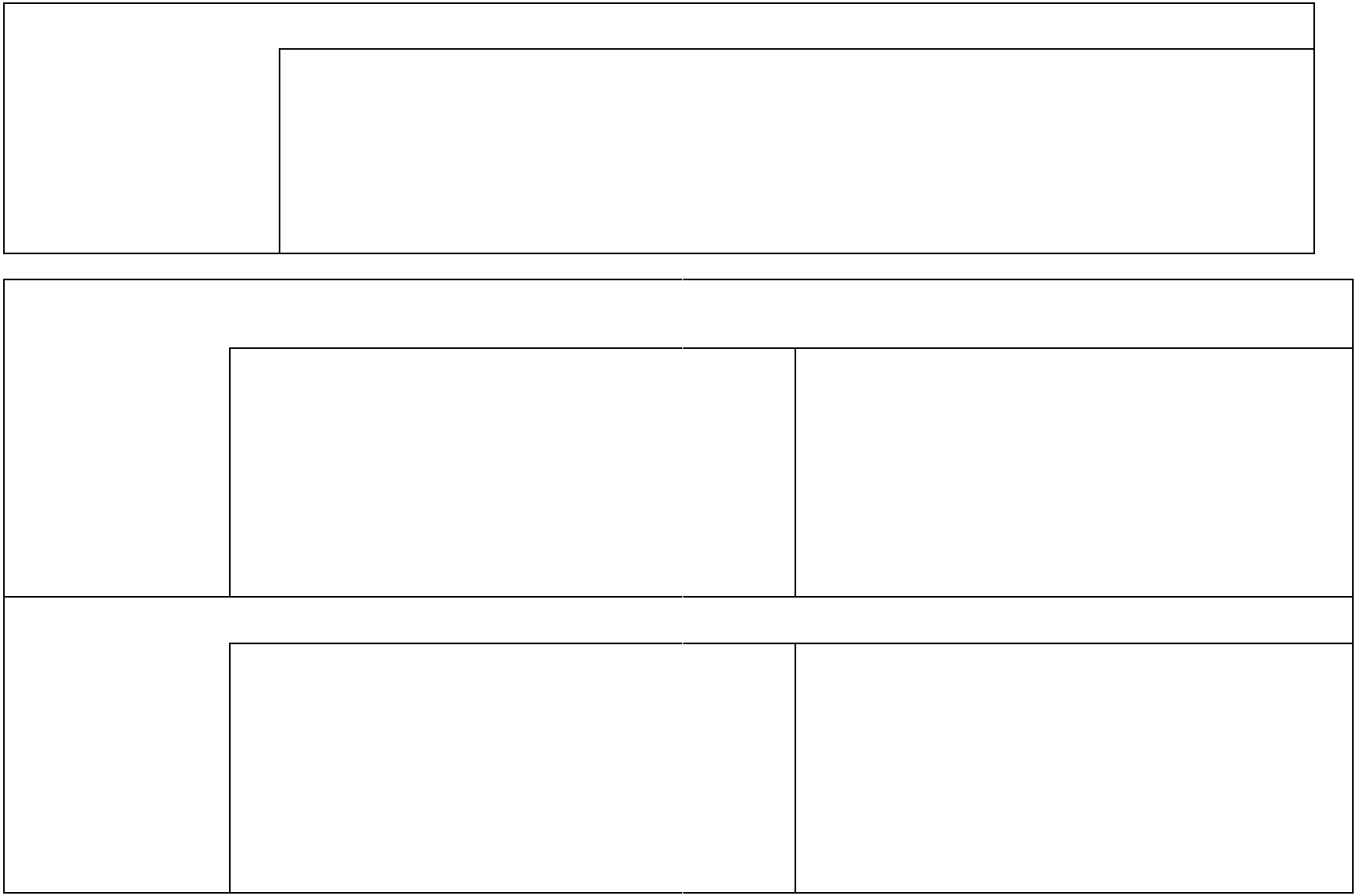
Average Annual Solar Radiation – Nearest Available Site

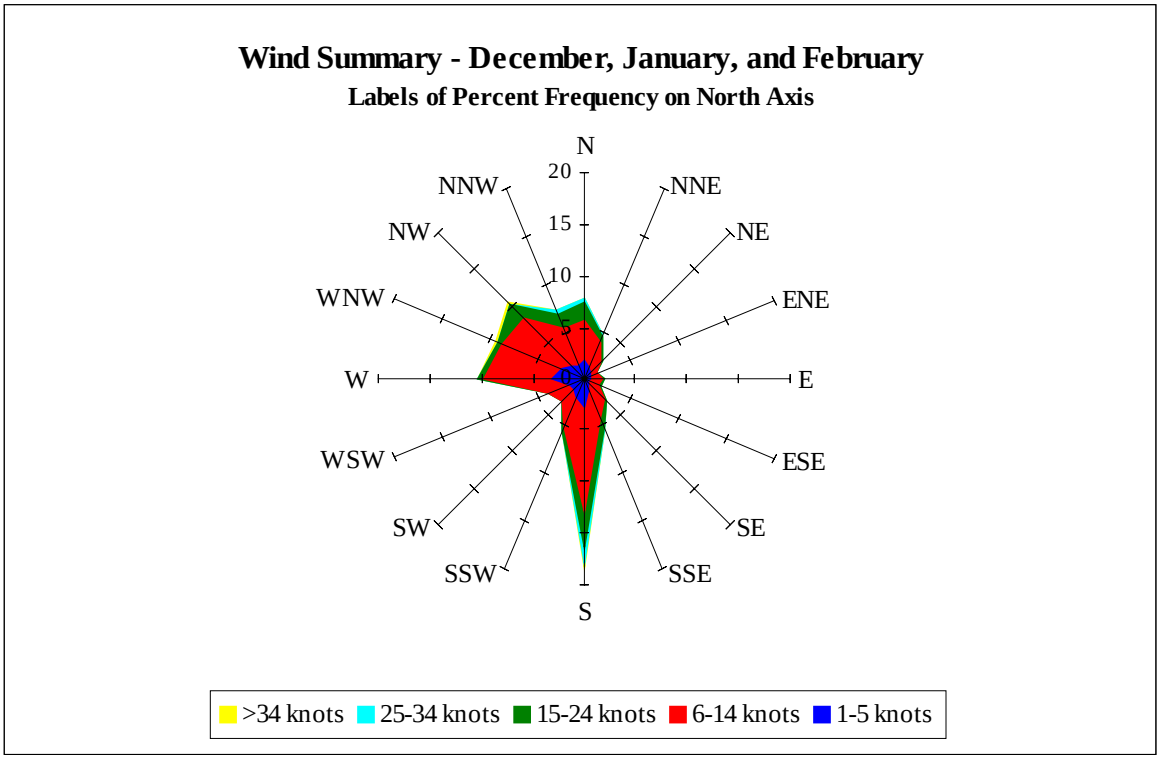
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

No Solar Radiation
Data Available

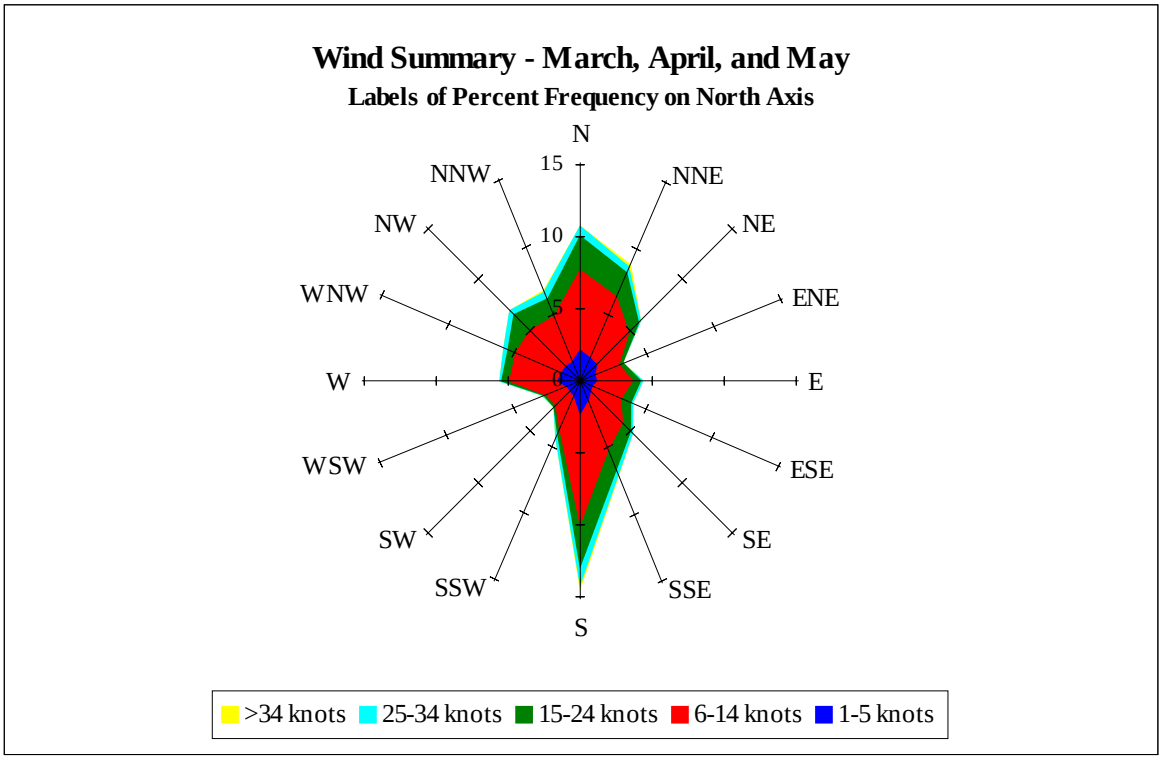
Average Annual Solar Heat and Illumination – Nearest Available Site

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





Percent Calm = 3.50



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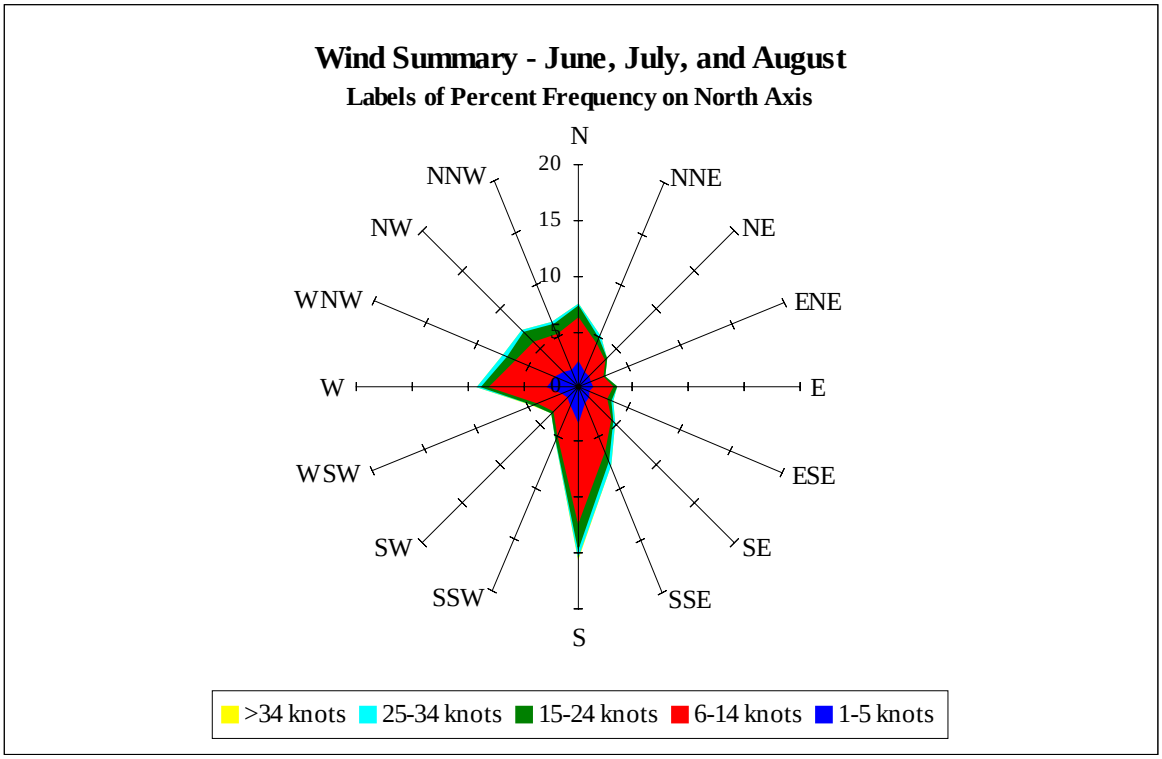
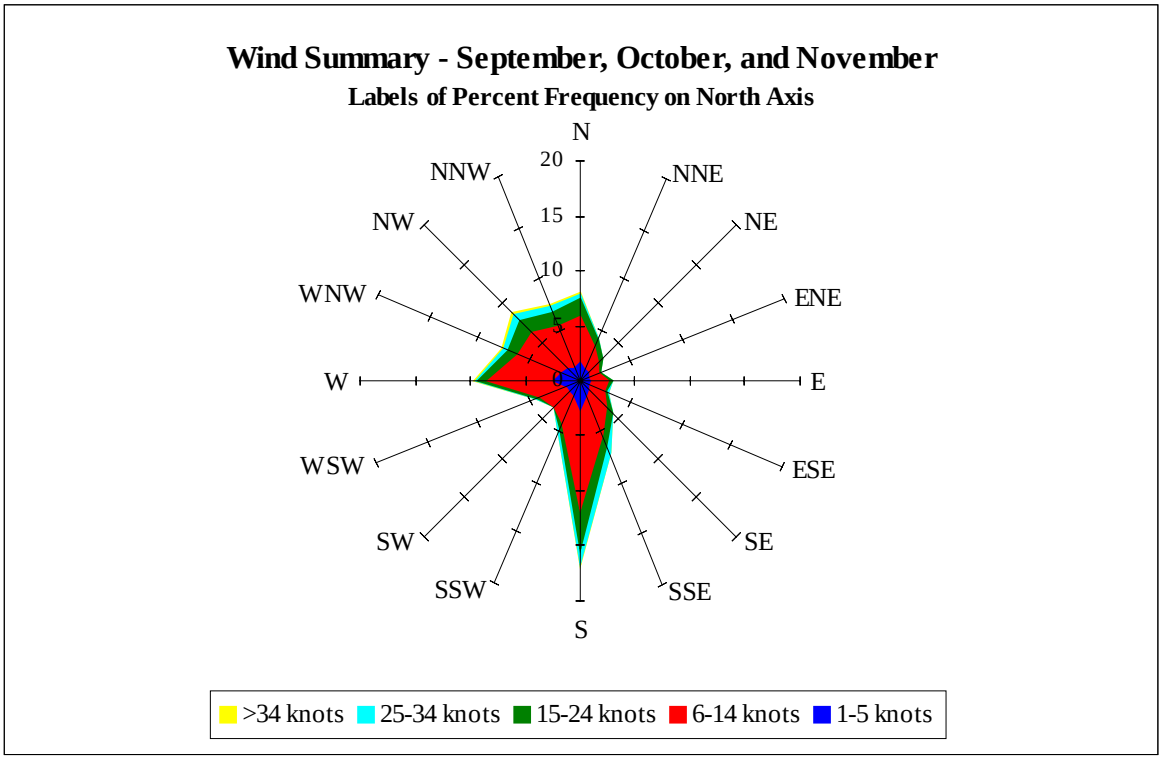


Percent Calm = 4.56



Percent Calm = 3.45