

SOUTH BEND/ST. JOSEPH IN

Latitude = 41.70 N

WMO No. 725350

Longitude = 86.32 W

Elevation = 774 feet

Period of Record = 1973 to 1996

Average Pressure = 29.16 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	95	76	106	12.7	SW
0.4% Occurrence	91	74	106	11.8	SW
1.0% Occurrence	88	73	100	11.3	S
2.0% Occurrence	85	71	96	10.5	S
Mean Daily Range	17	-	-	-	-
97.5% Occurrence	10	9	7	10.1	SW
99.0% Occurrence	3	2	5	11.0	SW
99.6% Occurrence	-2	-3	4	11.7	SW
Median of Extreme Lows	-9	-9	2	14.1	SW
	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	90	139	11.4	WSW
0.4% Occurrence	77	86	126	10.8	SW
1.0% Occurrence	76	85	123	10.3	SW
2.0% Occurrence	74	82	116	9.4	S
	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	145	86	0.94	10.0	SW
0.4% Occurrence	131	83	0.85	9.9	SW
1.0% Occurrence	126	82	0.82	9.2	SW
2.0% Occurrence	118	79	0.77	9.0	SW
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		20	549	294	1110

Other Site Data

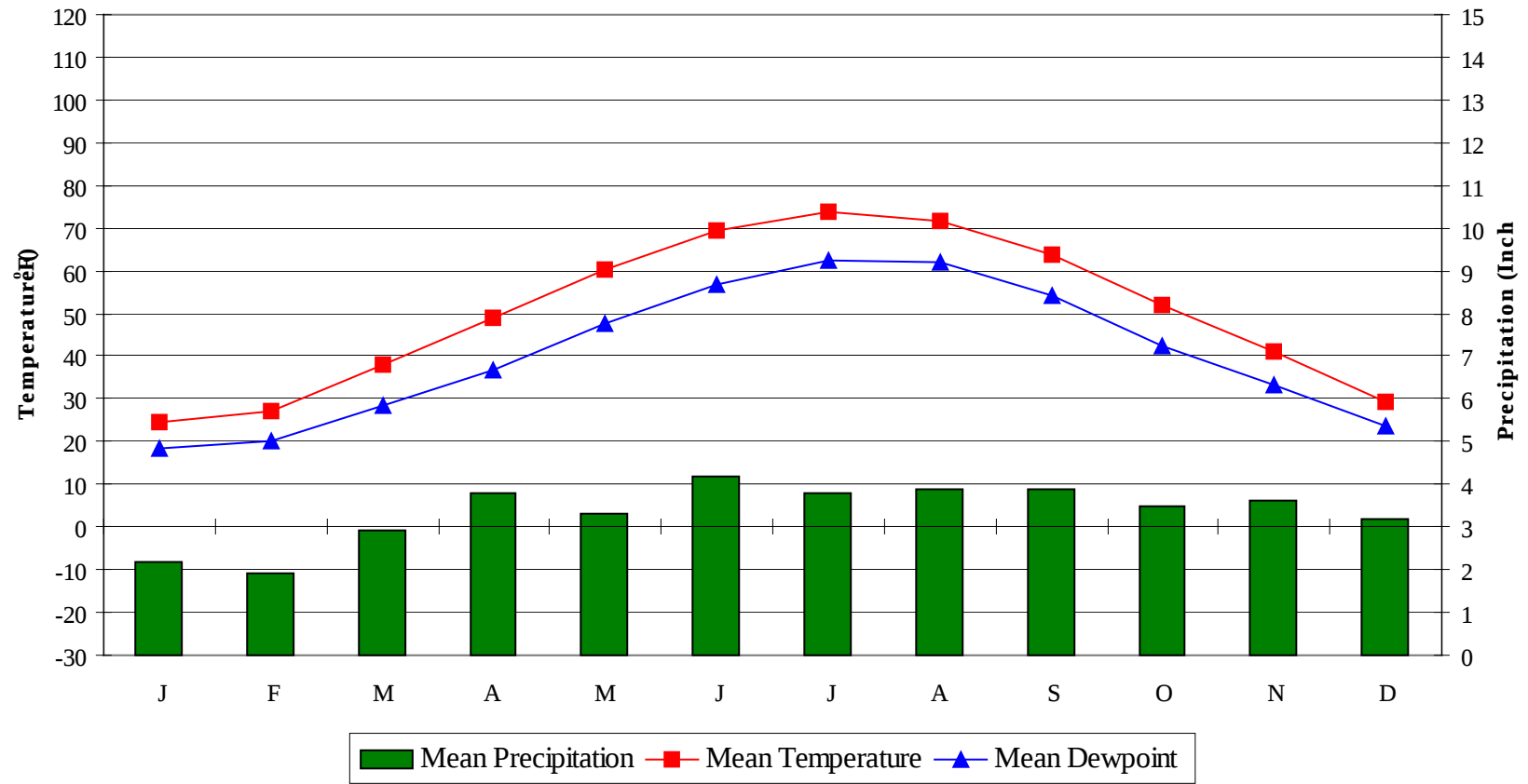
Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
6	3.0	90	1.6 + 0.5
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft ²)	Average Annual Freeze-Thaw Cycles (#)
52.6	N/A	41	54

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

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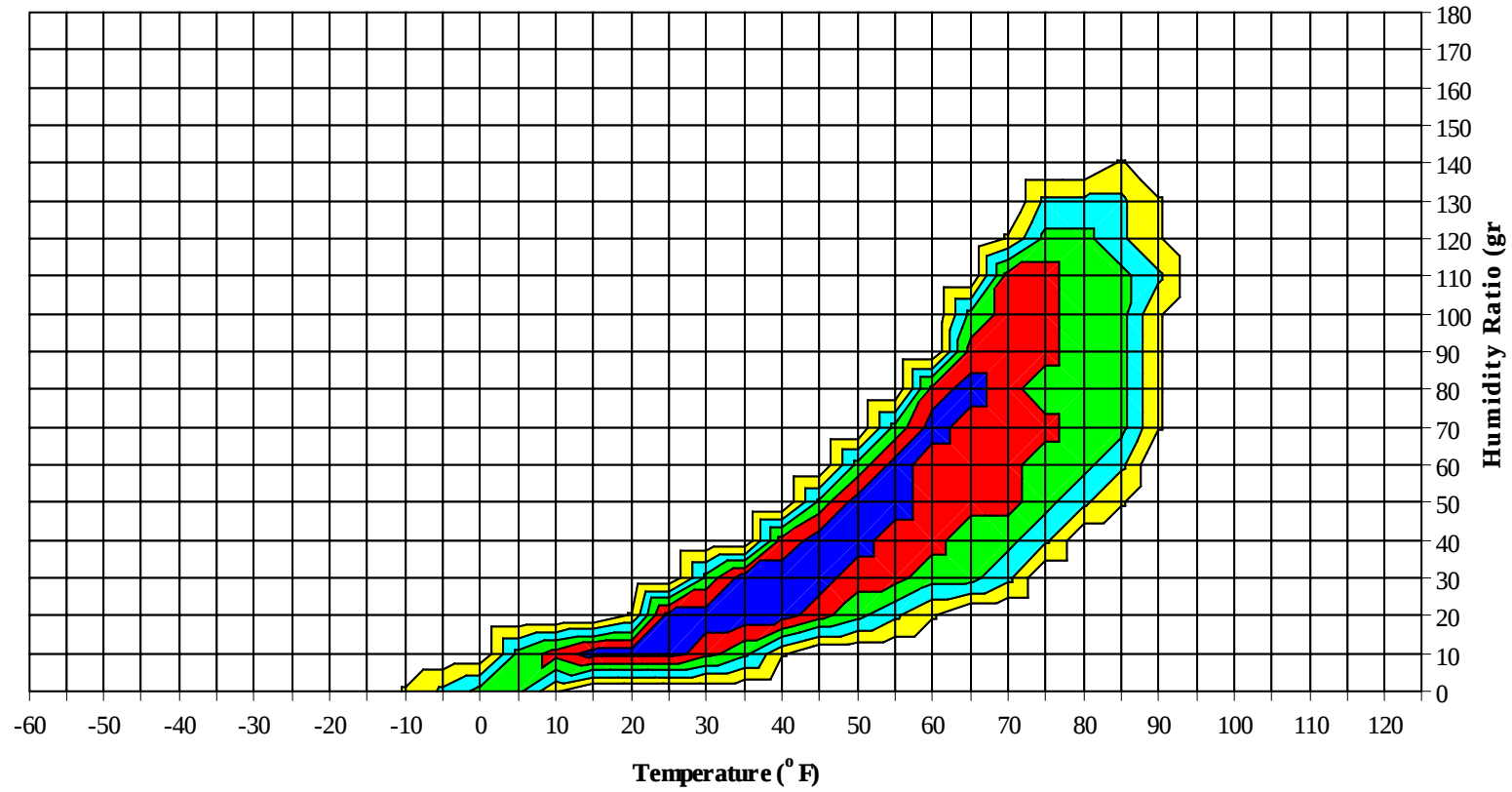
Average Annual Climate



SOUTH BEND/ST. JOSEPH IN

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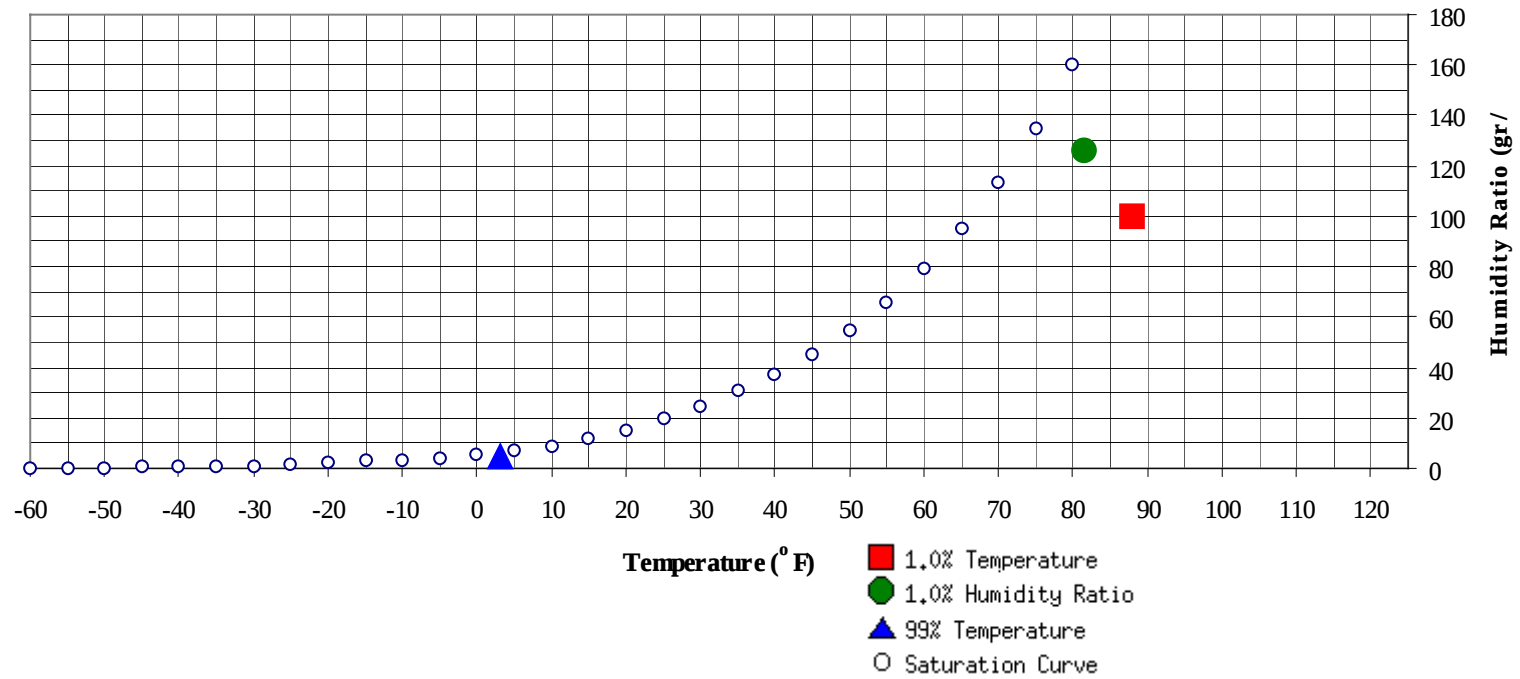
Long Term Psychrometric Summary



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

SOUTH BEND/ST. JOSEPH IN

WMO No. 725350

Psychrometric Summary of Peak Design Values

99% Dry Bulb	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
	3	4.8	1.4		126	81.5	75.4	73	39.3

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	88	100.1	72.7	36.9

SOUTH BEND/ST. JOSEPH IN WMO No. 725350
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		
100 / 104															
95 / 99															
90 / 94															
85 / 89												0		0	61.0
80 / 84												0	0	0	60.7
75 / 79												1	1	2	61.3
70 / 74												5	2	7	58.0
65 / 69							0	0	1	53.7	1	7	5	13	56.7
60 / 64		0	0	0	55.1		1	1	2	51.2	6	10	9	25	54.1
55 / 59	1	1	1	2	53.4	1	3	2	6	49.2	6	16	13	35	49.8
50 / 54	2	4	3	9	48.9	3	5	5	12	45.9	11	19	19	49	45.8
45 / 49	3	5	4	12	43.0	5	10	8	23	42.2	16	29	24	69	41.8
40 / 44	7	12	11	29	38.9	11	24	19	54	38.1	24	41	35	100	37.8
35 / 39	25	33	30	88	34.3	26	35	33	95	34.1	47	48	49	143	33.7
30 / 34	46	48	47	141	30.1	39	38	38	115	29.7	55	35	44	134	29.5
25 / 29	36	41	42	119	25.1	34	35	37	106	24.8	33	20	25	78	24.6
20 / 24	38	37	35	110	20.3	31	28	31	90	20.3	24	10	15	49	20.2
15 / 19	31	27	30	88	15.7	23	20	21	64	15.7	14	4	6	24	15.6
10 / 14	26	16	20	61	11.1	19	11	14	44	10.9	7	2	2	12	10.9
5 / 9	13	10	10	33	6.2	14	7	8	28	6.3	3	0	0	4	6.4
0 / 4	11	7	7	25	1.4	11	4	5	20	1.3	1	0		1	2.6
-5 / -1	5	2	4	11	-3.1	4	1	2	7	-3.0					
-10 / -6	4	2	2	8	-7.3	2	1	1	4	-7.5					
-15 / -11	2	1	1	4	-12.4	1	0	0	1	-11.5					
-20 / -16	1	0	0	2	-16.8										
-25 / -21	0	0		0	-20.6										

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.

SOUTH BEND/ST. JOSEPH IN WMO No. 725350
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)			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		
100 / 104												0	0	0	76.0
95 / 99												1	0	1	74.0
90 / 94							1	0	1	70.5		7	3	10	72.0
85 / 89		1	0	1	65.7		11	4	15	68.4		26	13	39	70.3
80 / 84		5	2	7	63.9		17	9	26	66.6	1	44	27	71	68.1
75 / 79		6	4	11	62.0	1	26	16	43	63.9	13	50	42	105	66.3
70 / 74	1	14	10	24	59.2	12	35	30	77	61.9	39	50	51	140	64.3
65 / 69	9	20	16	45	57.3	23	40	37	100	58.8	57	33	44	134	61.2
60 / 64	14	26	22	63	54.0	39	45	43	127	55.3	56	18	31	104	57.5
55 / 59	16	34	28	78	49.2	39	35	38	112	51.1	40	9	20	68	53.2
50 / 54	21	37	34	92	45.8	44	21	31	97	47.3	25	2	7	34	49.5
45 / 49	40	37	38	115	42.3	43	13	24	81	43.6	8	0	2	10	44.9
40 / 44	51	33	37	120	38.2	30	4	12	46	39.7	3		0	3	41.2
35 / 39	41	18	26	85	34.0	14	0	2	17	35.1	0			0	37.6
30 / 34	28	8	14	51	29.6	3		0	3	30.8					
25 / 29	14	2	5	21	25.2	0			0	27.7					
20 / 24	5	0	1	6	20.7										
15 / 19	1		0	1	16.6										
10 / 14	0			0	12.7										
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															

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SOUTH BEND/ST. JOSEPH IN

WMO No. 725350

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		
100 / 104		0	0	0	77.0		0	0	0	76.8					
95 / 99		3	2	5	76.5		2	1	2	77.0		0		0	72.0
90 / 94		13	6	19	75.5		8	3	10	76.2		2	1	3	73.4
85 / 89	0	37	20	57	73.3		25	12	37	74.0		8	3	11	71.7
80 / 84	4	63	43	109	70.4	2	54	32	88	71.0	0	23	10	34	69.6
75 / 79	29	63	57	149	68.5	18	69	52	139	68.7	5	36	23	63	67.0
70 / 74	64	47	58	169	66.3	56	55	64	174	66.7	22	47	36	106	64.7
65 / 69	69	16	37	122	63.2	65	25	45	136	63.3	35	46	43	124	61.3
60 / 64	51	4	20	75	59.1	56	9	28	93	59.2	44	38	45	127	57.2
55 / 59	25	0	5	31	54.9	34	1	9	45	55.1	44	24	38	107	53.2
50 / 54	6	0	1	7	50.6	14	0	2	16	50.8	44	12	25	81	49.2
45 / 49	1			1	45.8	3		0	3	46.3	31	2	12	46	45.2
40 / 44						0		0	1	42.1	12	0	3	15	40.8
35 / 39											4		0	4	36.5
30 / 34											0			0	32.0
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															

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SOUTH BEND/ST. JOSEPH IN WMO No. 725350
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		
100 / 104															
95 / 99															
90 / 94															
85 / 89		0		0	63.8										
80 / 84		3	1	4	64.7										
75 / 79	0	8	3	11	63.3		0		0	62.3					
70 / 74	1	18	9	29	60.5	0	3	1	4	60.5		0		0	65.0
65 / 69	8	26	19	54	58.5	1	6	4	11	59.1		1	0	1	60.8
60 / 64	20	39	33	91	55.4	7	13	13	34	57.1	2	2	1	5	58.3
55 / 59	29	44	38	111	51.3	15	19	15	49	52.4	2	3	4	10	54.1
50 / 54	39	44	44	127	47.2	16	23	18	58	47.2	4	5	5	14	48.3
45 / 49	49	35	45	130	43.4	23	34	29	86	42.7	5	9	7	21	43.6
40 / 44	48	21	34	103	39.3	34	45	44	123	38.6	14	23	16	53	38.6
35 / 39	35	6	17	59	35.1	44	41	47	132	34.0	38	50	46	134	34.4
30 / 34	15	1	4	20	31.1	54	33	42	130	29.8	60	59	70	189	30.1
25 / 29	4	0	0	5	26.7	30	14	19	63	25.3	43	35	36	114	25.2
20 / 24	0			0	22.4	11	4	5	20	20.9	29	23	23	75	20.6
15 / 19						4	1	2	8	16.3	17	14	16	47	15.8
10 / 14						1	0	1	2	11.1	15	10	11	36	11.0
5 / 9						0	0	0	1	7.2	8	5	7	21	6.4
0 / 4											6	4	4	14	1.6
-5 / -1											1	1	1	4	-2.6
-10 / -6											2	1	1	4	-7.8
-15 / -11											1	0	0	2	-11.2
-20 / -16											0			0	-15.0
-25 / -21															

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SOUTH BEND/ST. JOSEPH IN WMO No. 725350
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)
Period of Record = 1973 to 1996

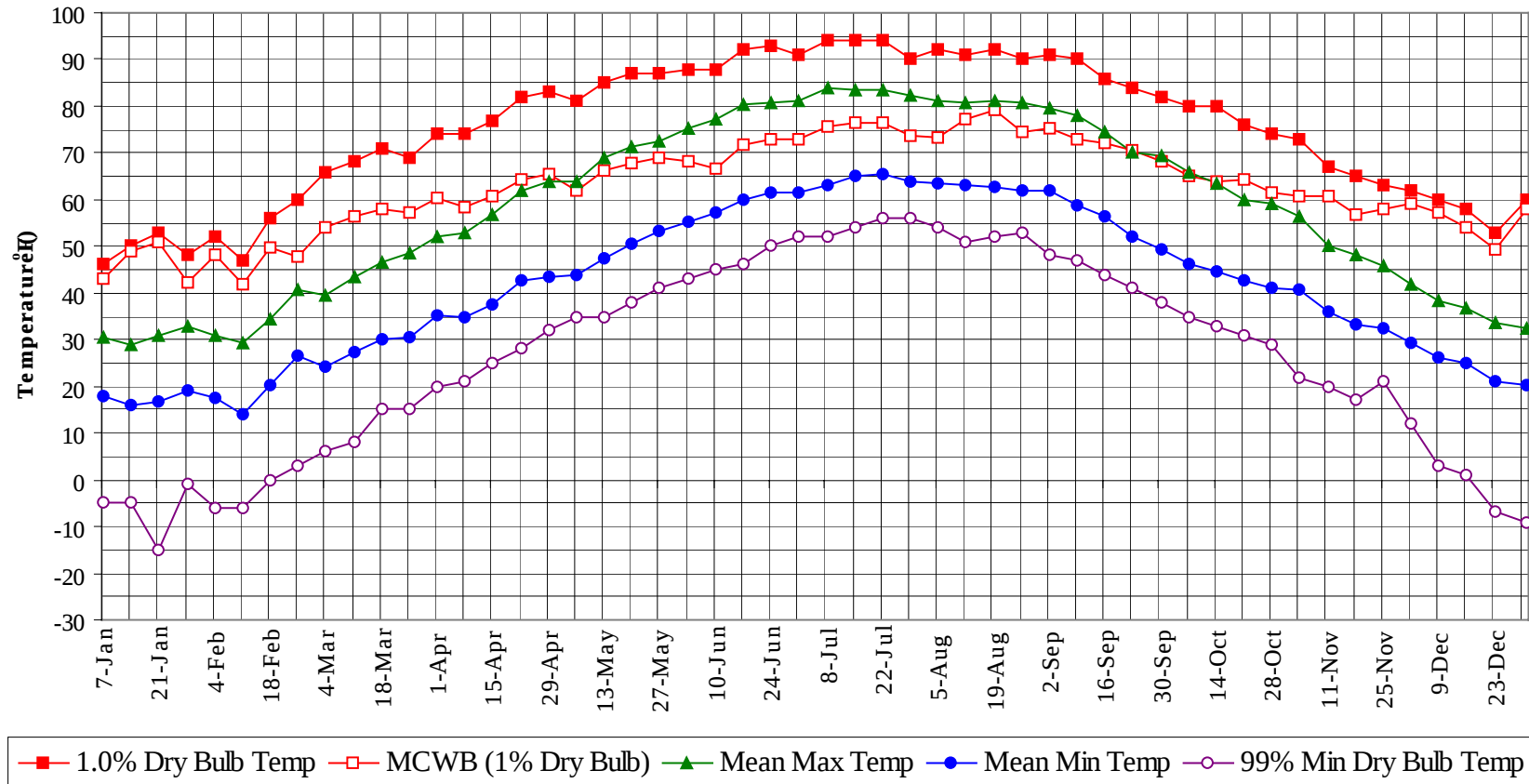
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
100 / 104		1	0	1	76.5
95 / 99		6	3	9	76.2
90 / 94		30	13	43	74.6
85 / 89	0	107	52	159	72.1
80 / 84	7	208	124	339	69.5
75 / 79	66	259	198	522	67.3
70 / 74	195	272	261	727	64.7
65 / 69	267	221	251	738	61.1
60 / 64	294	205	245	744	56.8
55 / 59	251	191	211	653	52.0
50 / 54	228	173	195	596	47.4
45 / 49	228	175	194	597	43.1
40 / 44	234	202	212	648	38.6
35 / 39	276	232	251	758	34.2
30 / 34	301	224	261	786	29.9
25 / 29	194	147	165	506	25.0
20 / 24	138	104	110	352	20.4
15 / 19	91	67	74	233	15.7
10 / 14	69	38	48	156	11.0
5 / 9	39	23	26	87	6.3
0 / 4	29	15	16	60	1.4
-5 / -1	10	5	7	22	-3.0
-10 / -6	9	3	4	15	-7.4
-15 / -11	4	2	2	7	-11.9
-20 / -16	1	0	0	2	-16.7
-25 / -21	0	0		0	-20.6

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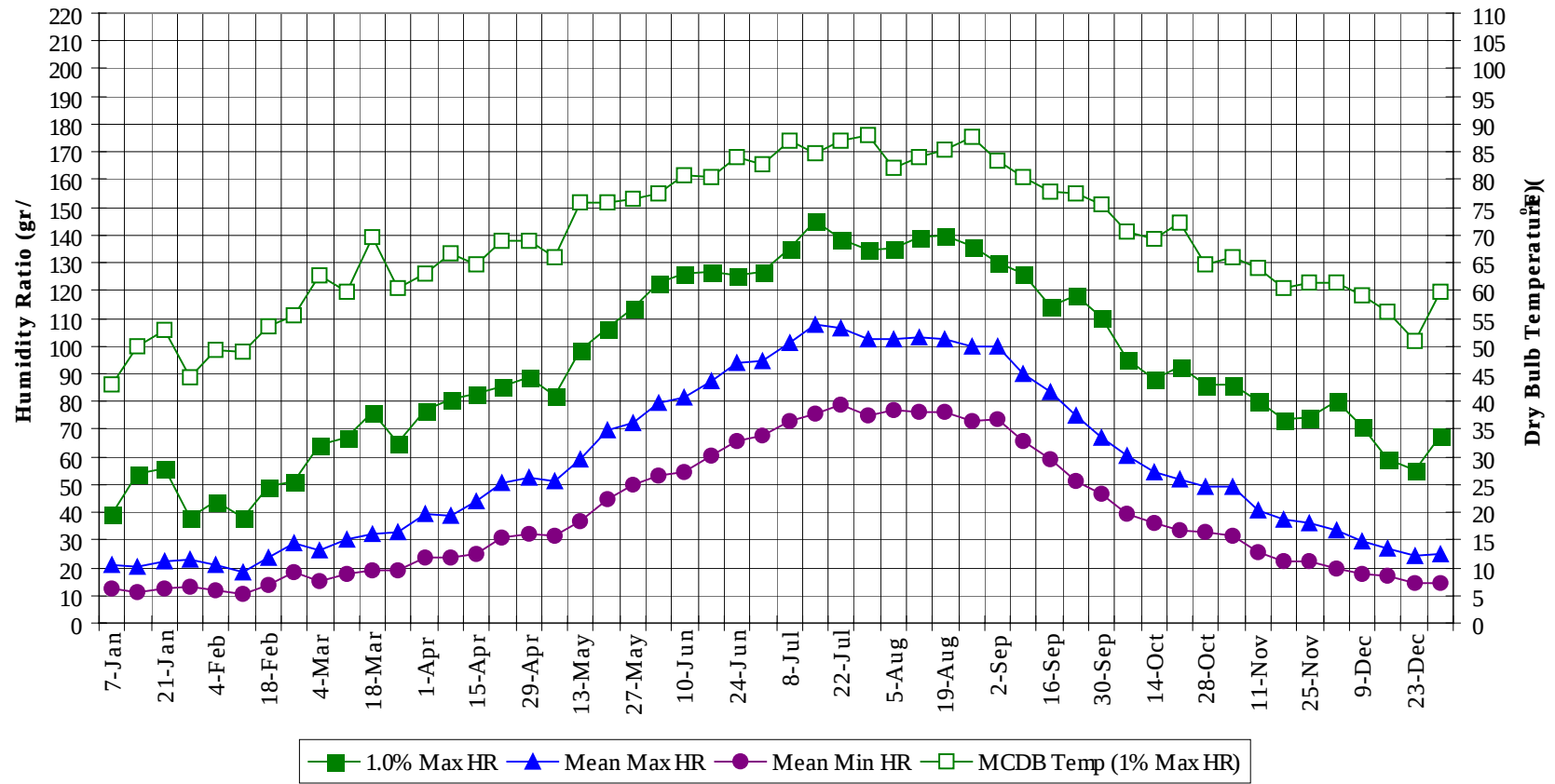
SOUTH BEND/ST. JOSEPH IN

WMO No. 725350

Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary



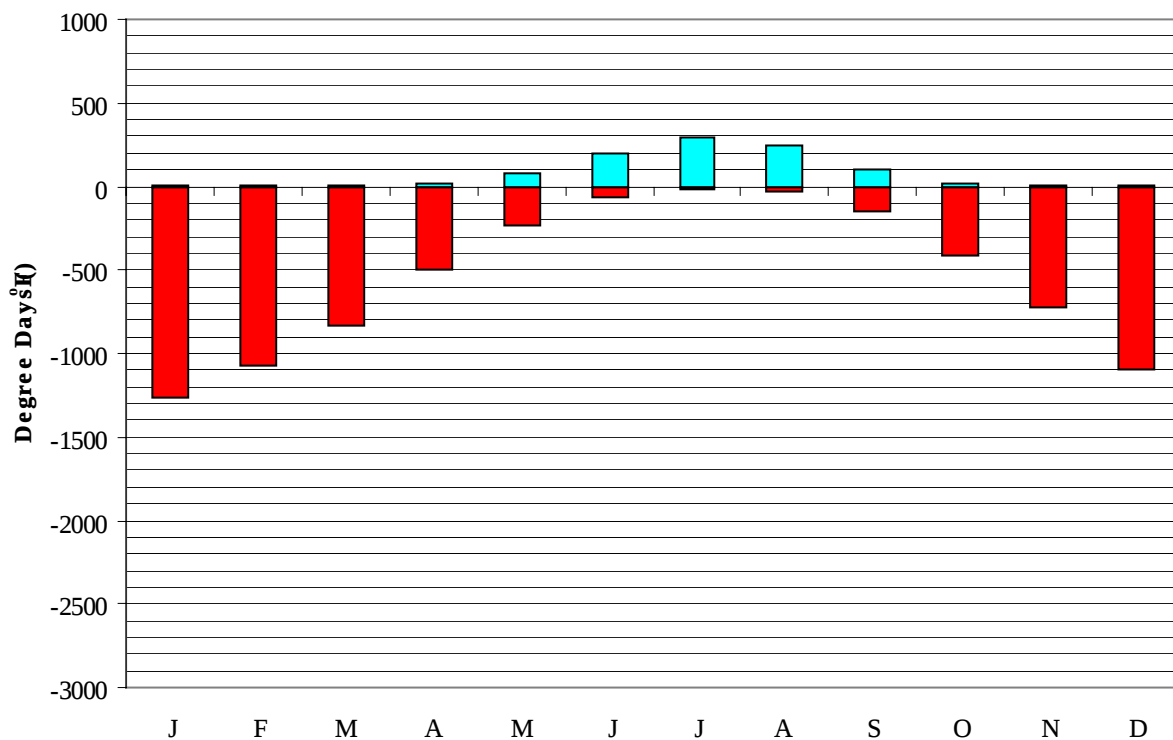
SOUTH BEND/ST. JOSEPH IN WMO No. 725350
Long Term Dry Bulb Temperature and Humidity Summary

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	46.0	43.0	30.3	18.1	-5.0	39.2	43.1	20.8	12.4
14-Jan	50.0	48.9	29.0	15.9	-5.0	53.9	49.8	20.6	11.1
21-Jan	53.0	51.0	30.7	16.6	-15.0	56.0	52.8	22.6	12.8
28-Jan	48.0	42.3	33.0	18.9	-1.0	37.8	44.2	23.1	12.9
4-Feb	52.0	48.1	31.1	17.5	-6.0	44.1	49.2	21.1	12.1
11-Feb	47.0	42.0	29.2	14.0	-6.0	37.8	48.9	18.5	10.2
18-Feb	56.0	49.7	34.6	20.2	0.0	49.0	53.4	23.4	13.8
25-Feb	60.0	47.9	40.5	26.6	3.0	51.1	55.4	28.9	18.2
4-Mar	66.0	54.2	39.7	24.1	6.0	64.4	62.8	26.5	15.2
11-Mar	68.0	56.5	43.4	27.3	8.0	67.2	59.8	30.5	17.9
18-Mar	71.0	58.1	46.4	30.1	15.0	76.3	69.6	32.4	19.4
25-Mar	69.0	57.1	48.5	30.5	15.0	65.1	60.5	33.0	19.3
1-Apr	74.0	60.5	52.0	35.3	20.0	77.0	63.1	39.5	23.8
8-Apr	74.0	58.4	52.8	34.8	21.0	80.5	66.8	39.0	23.4
15-Apr	77.0	60.8	56.7	37.6	25.0	82.6	64.8	44.2	24.9
22-Apr	82.0	64.2	61.9	42.5	28.0	85.4	69.0	50.8	30.8
29-Apr	83.0	65.3	63.7	43.5	32.0	88.9	69.0	52.4	32.0
6-May	81.0	61.8	63.9	43.9	35.0	81.9	65.9	51.3	31.4
13-May	85.0	66.2	68.9	47.5	35.0	98.7	75.7	58.9	36.7
20-May	87.0	67.9	71.2	50.4	38.0	106.4	75.8	69.4	44.6
27-May	87.0	68.8	72.4	53.1	41.0	113.4	76.5	72.5	50.2
3-Jun	88.0	68.3	75.1	55.2	43.0	122.5	77.4	79.8	53.3
10-Jun	88.0	66.5	77.4	57.1	45.0	126.0	80.8	81.6	54.5
17-Jun	92.0	71.5	80.4	59.9	46.0	126.7	80.5	87.5	60.2
24-Jun	93.0	72.9	80.8	61.4	50.0	125.3	84.2	93.7	65.4
1-Jul	91.0	72.9	81.0	61.7	52.0	126.7	82.7	94.5	67.9
8-Jul	94.0	75.5	83.7	63.2	52.0	135.1	86.9	101.2	72.7
15-Jul	94.0	76.6	83.3	64.9	54.0	144.9	84.8	107.8	75.7
22-Jul	94.0	76.3	83.7	65.5	56.0	138.6	87.0	106.6	79.1
29-Jul	90.0	73.5	82.4	63.8	56.0	134.4	87.9	102.8	75.1
5-Aug	92.0	73.3	81.3	63.3	54.0	135.1	82.1	102.6	77.0
12-Aug	91.0	77.2	80.9	62.9	51.0	139.3	84.0	102.9	76.5
19-Aug	92.0	79.2	81.2	62.6	52.0	140.0	85.5	102.2	76.3
26-Aug	90.0	74.6	80.8	61.9	53.0	135.8	87.6	99.6	73.0
2-Sep	91.0	75.1	79.7	61.8	48.0	130.2	83.4	99.7	73.5
9-Sep	90.0	73.0	78.0	58.6	47.0	126.0	80.6	89.8	65.5
16-Sep	86.0	72.1	74.4	56.5	44.0	114.1	77.9	83.6	58.9
23-Sep	84.0	70.7	70.1	52.0	41.0	118.3	77.6	75.1	51.1
30-Sep	82.0	68.3	69.3	49.4	38.0	110.6	75.6	67.1	46.7
7-Oct	80.0	65.1	65.9	46.3	35.0	95.2	70.5	60.2	39.2
14-Oct	80.0	64.0	63.3	44.6	33.0	88.2	69.2	54.5	35.9
21-Oct	76.0	64.2	59.9	42.7	31.0	92.4	72.1	51.9	33.6
28-Oct	74.0	61.5	59.2	41.1	29.0	86.1	64.6	49.4	32.8
4-Nov	73.0	60.8	56.5	40.6	22.0	86.1	65.9	49.3	31.9
11-Nov	67.0	60.7	50.1	35.8	20.0	79.8	64.1	41.0	25.7
18-Nov	65.0	56.9	48.2	33.3	17.0	73.5	60.5	37.7	22.5
25-Nov	63.0	57.9	45.8	32.5	21.0	74.2	61.3	36.2	22.4
2-Dec	62.0	59.1	41.7	29.3	12.0	79.8	61.3	33.5	19.7
9-Dec	60.0	57.1	38.2	26.4	3.0	70.7	59.0	29.2	17.7
16-Dec	58.0	54.0	36.6	25.0	1.0	58.8	56.1	27.1	17.0
23-Dec	53.0	49.4	33.6	20.9	-7.0	55.3	50.8	24.5	14.7
31-Dec	60.0	57.9	32.6	20.1	-9.0	67.9	59.9	24.7	14.6

SOUTH BEND/ST. JOSEPH IN

WMO No. 725350

Degree Days, Heating and Cooling (Base 65°F)



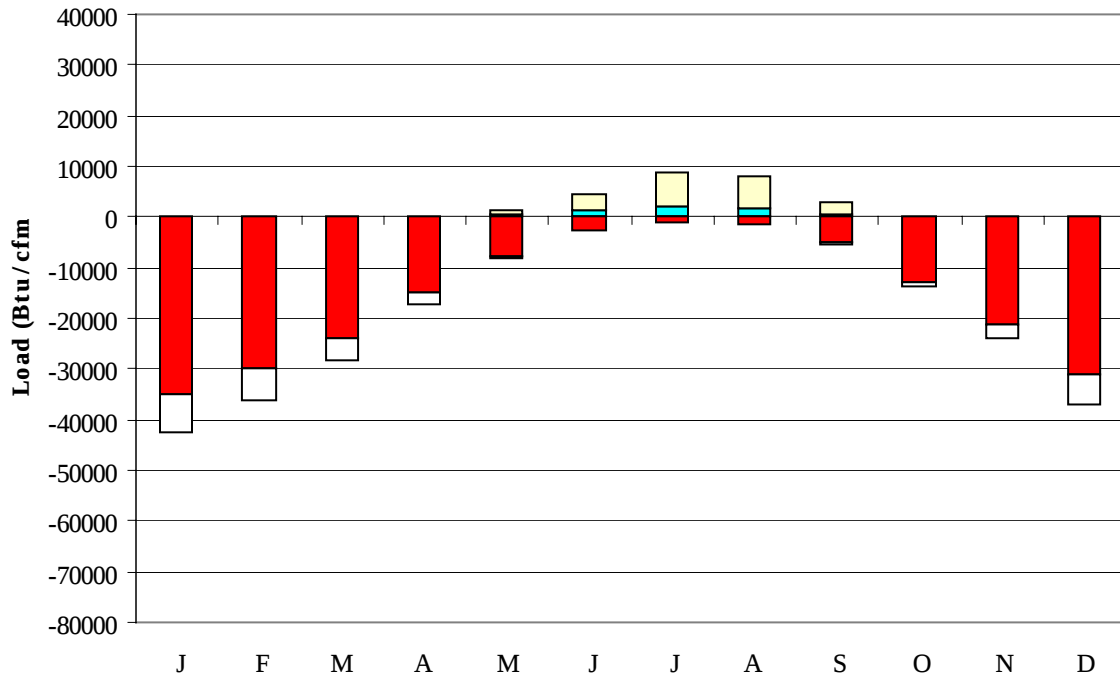
■ Mean Cooling Degree Days ■ Mean Heating Degree Days

	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1259
FEB	0	1066
MAR	4	834
APR	21	500
MAY	83	231
JUN	200	63
JUL	290	22
AUG	240	35
SEP	107	146
OCT	20	417
NOV	2	725
DEC	0	1099
ANN	966	6397

SOUTH BEND/ST. JOSEPH IN

WMO No. 725350

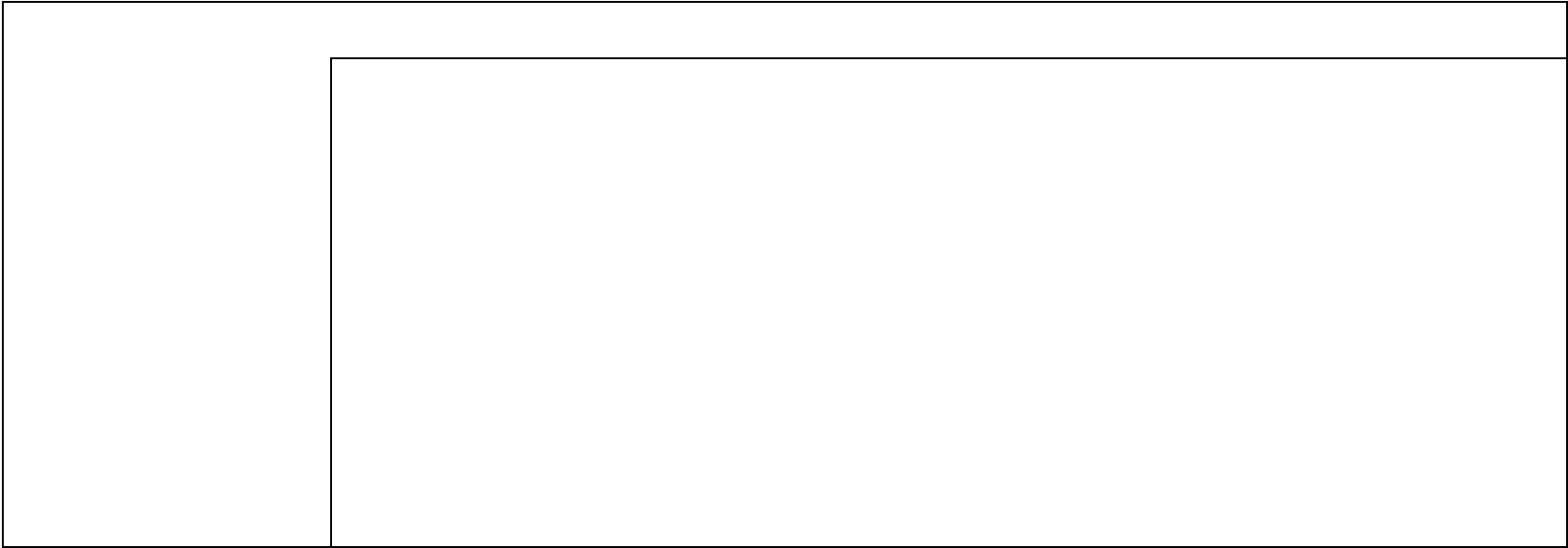
Average Ventilation and Infiltration Loads
(Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)



■ Average Sensible Cooling Load ■ Average Sensible Heating Load
■ Average Latent Cooling (Drying) Load ■ Average Latent Heating (Humidifying) Load

	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	-35050	0	-7590
FEB	0	-29839	0	-6393
MAR	6	-23989	3	-4465
APR	81	-15063	35	-1987
MAY	465	-7703	846	-355
JUN	1415	-2509	2912	-11
JUL	2273	-1063	6652	0
AUG	1582	-1569	6307	0
SEP	541	-5175	2158	-28
OCT	47	-12989	115	-683
NOV	0	-21096	12	-2950
DEC	0	-30898	2	-5889
ANN	6410	-186943	19042	-30351

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

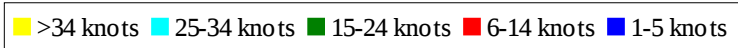
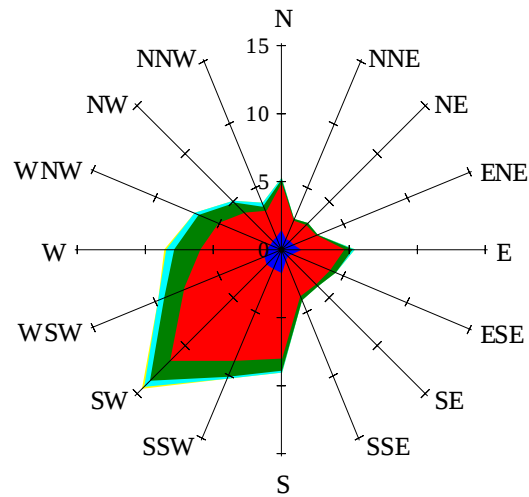


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

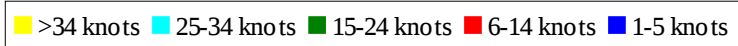
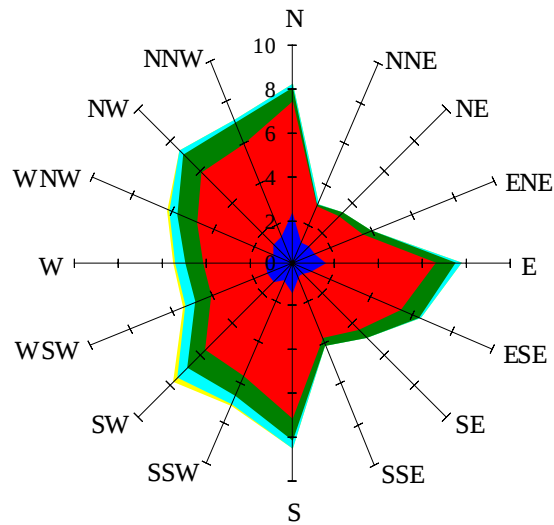
Labels of Percent Frequency on North Axis



Percent Calm = 3.13

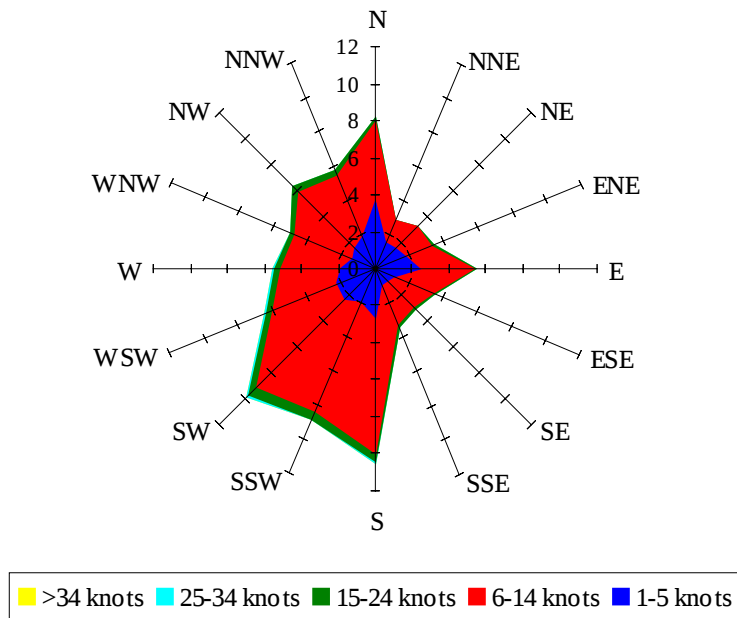
Wind Summary - March, April, and May

Labels of Percent Frequency on North Axis



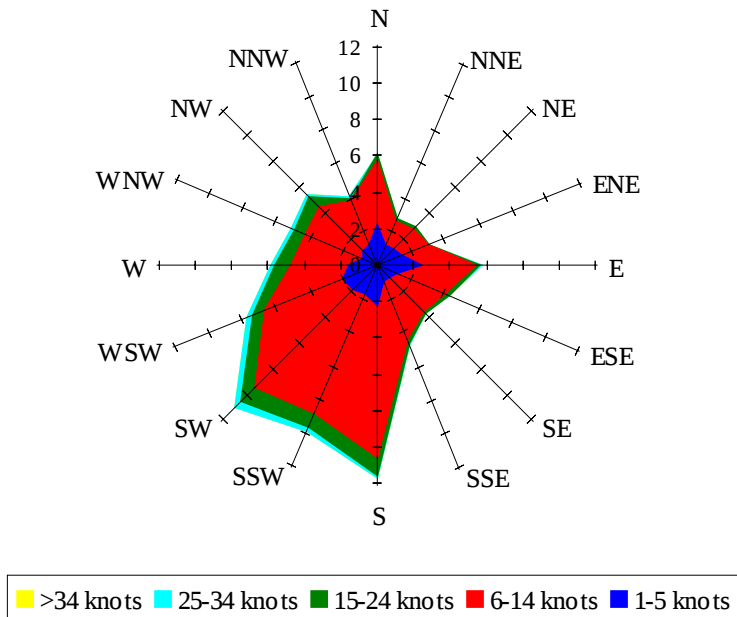
Percent Calm = 4.42

Wind Summary - June, July, and August **Labels of Percent Frequency on North Axis**



Percent Calm = 9.32

Wind Summary - September, October, and November **Labels of Percent Frequency on North Axis**



Percent Calm = 6.67