

**UBON RATCHATHANI, TH**

Latitude = 15.25 N

Longitude = 104.87 E

Period of Record = 1988 To 2017

Station ID = ICAO\_VTUU

Elevation = 406 Feet

Average Pressure = 29.36 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  | 103                              | 79                        | 110                    | 5.2              | SW                          |
| 0.4% Occurrence          | 100                              | 78                        | 114                    | 4.8              | S                           |
| 1.0% Occurrence          | 98                               | 78                        | 115                    | 4.6              | S                           |
| 2.0% Occurrence          | 96                               | 78                        | 116                    | 4.5              | S                           |
| Mean Daily Range         | 17                               | -                         | -                      | -                | NNE                         |
| 97.5% Occurrence         | 64                               | 60                        | 73                     | 5.8              | NNE                         |
| 99.0% Occurrence         | 62                               | 59                        | 69                     | 5.8              | NNE                         |
| 99.6% Occurrence         | 59                               | 56                        | 63                     | 5.4              | NNE                         |
| Median of Extreme Lows   | 55                               | 52                        | 54                     | 4.8              | NNE                         |

| 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                | 95                        | 157                    | 4.7              | SW                          |
| 0.4% Occurrence                   | 82                | 91                        | 148                    | 4.7              | VRB                         |
| 1.0% Occurrence                   | 81                | 90                        | 144                    | 4.4              | S                           |
| 2.0% Occurrence                   | 80                | 88                        | 141                    | 4.2              | S                           |

| 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 | 164                  | 86                        | 1.06                    | 3.6              | SSE                         |
| 0.4% Occurrence         | 155                  | 85                        | 1                       | 2.7              | SSE                         |
| 1.0% Occurrence         | 153                  | 84                        | 0.99                    | 3.6              | VRB                         |
| 2.0% Occurrence         | 152                  | 83                        | 0.99                    | 3.3              | VRB                         |

| Air Conditioning/<br>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 | 547                       | 4886                      | 6041                           | 7676                           |

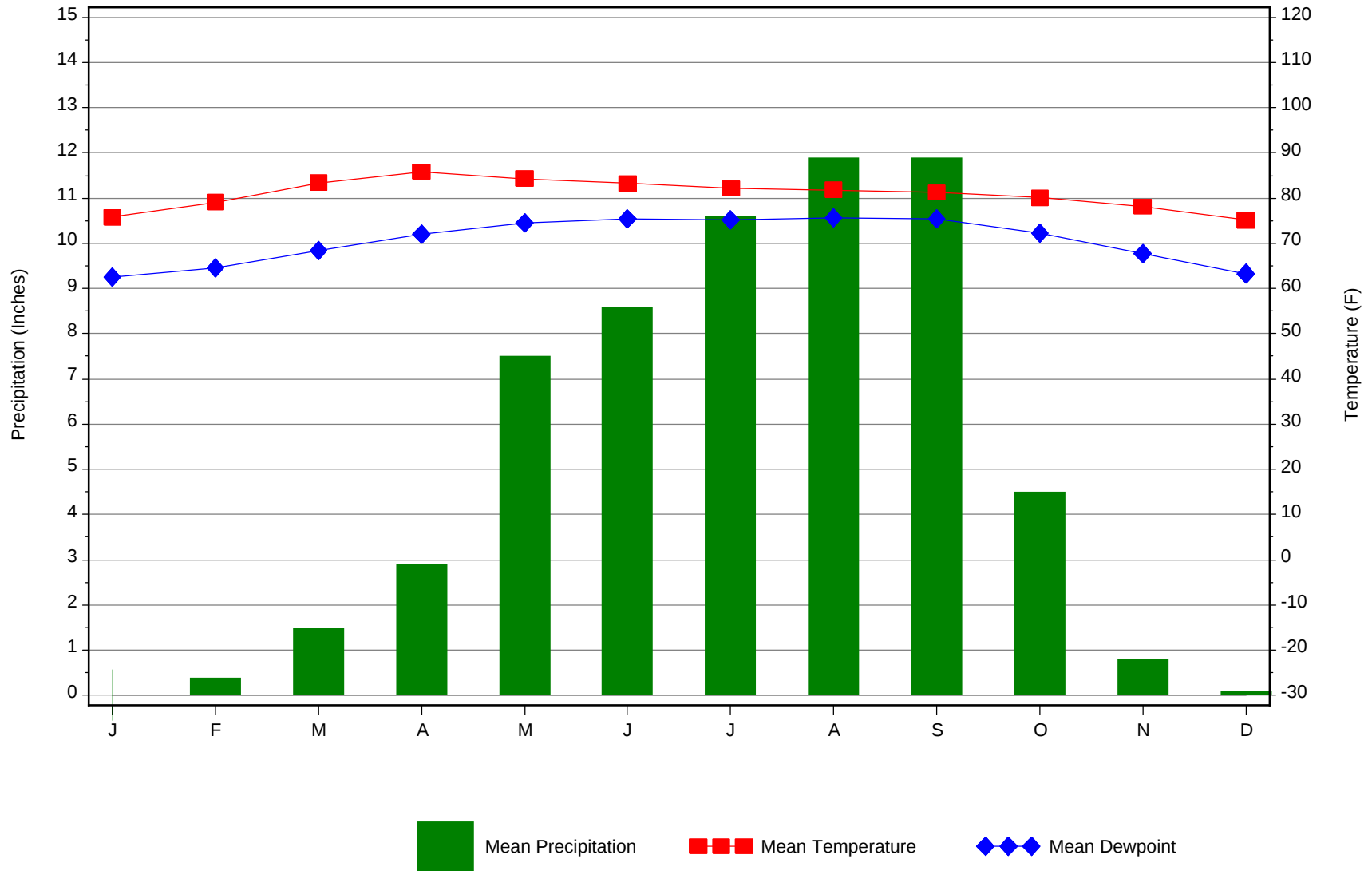
**Other Site Data**

| Weather Region                                     | Rain Rate<br>100 Year Recurrence<br>(in./hr) | Basic Wind Speed<br>3 sec gust @ 33 ft<br>50 Year Recurrence (mph) | Ventilation Cooling Load Index<br>(Ton-hr/cfm/yr) Base 75°F-RH 60%<br>Latent + Sensible |
|----------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 10                                                 | N/A                                          | N/A                                                                | 18.7 + 5.4                                                                              |
| Ground Water<br>Temperature (°F)<br>50 Foot Depth* | Frost Depth<br>50 Year Recurrence<br>(in)    | Ground Snow Load<br>50 Year Recurrence<br>(lb/ft <sup>2</sup> )    | Average Annual<br>Freeze-Thaw Cycles<br>(#)                                             |
| 83.4                                               | N/A                                          | N/A                                                                | 0                                                                                       |

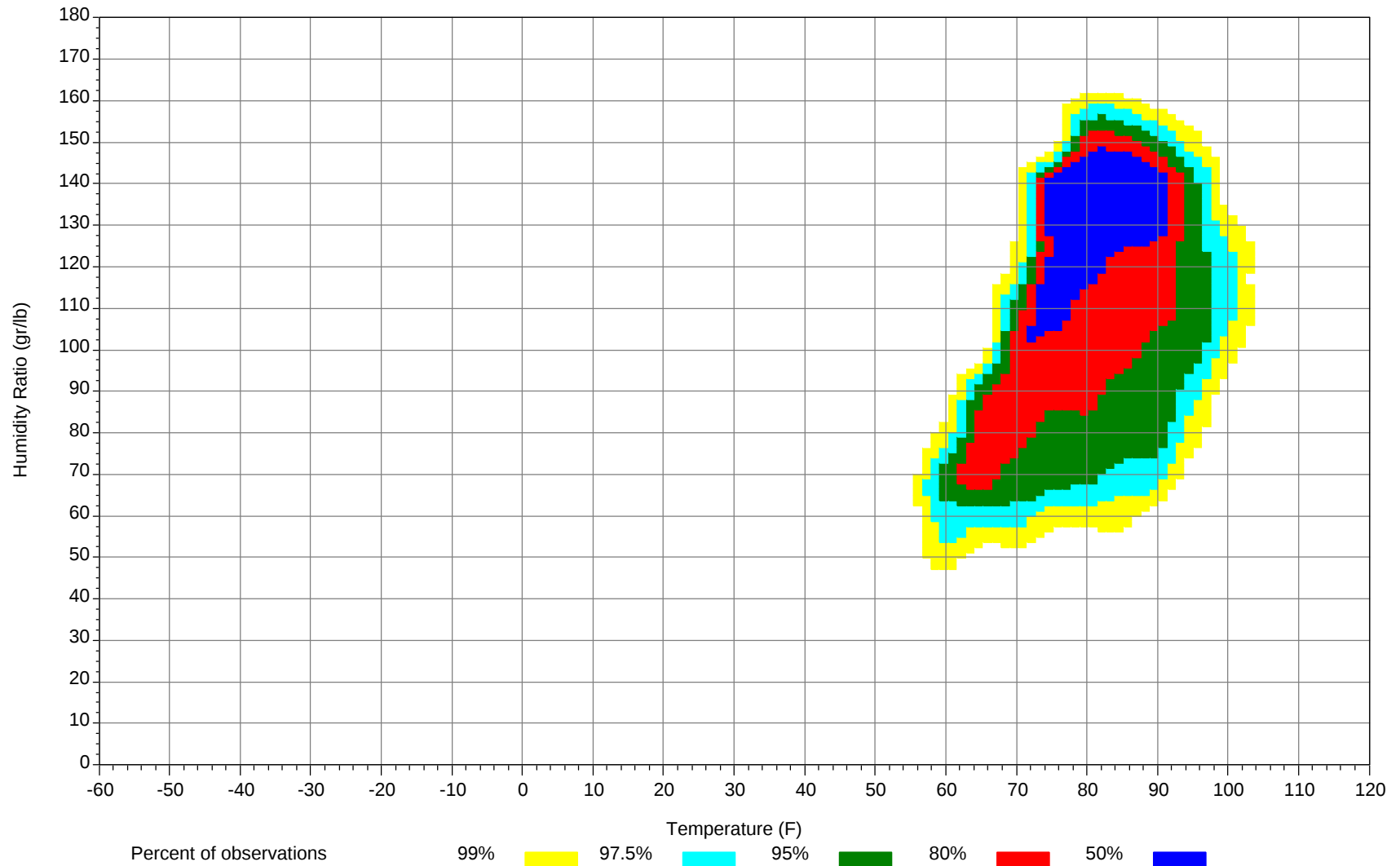
\*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.



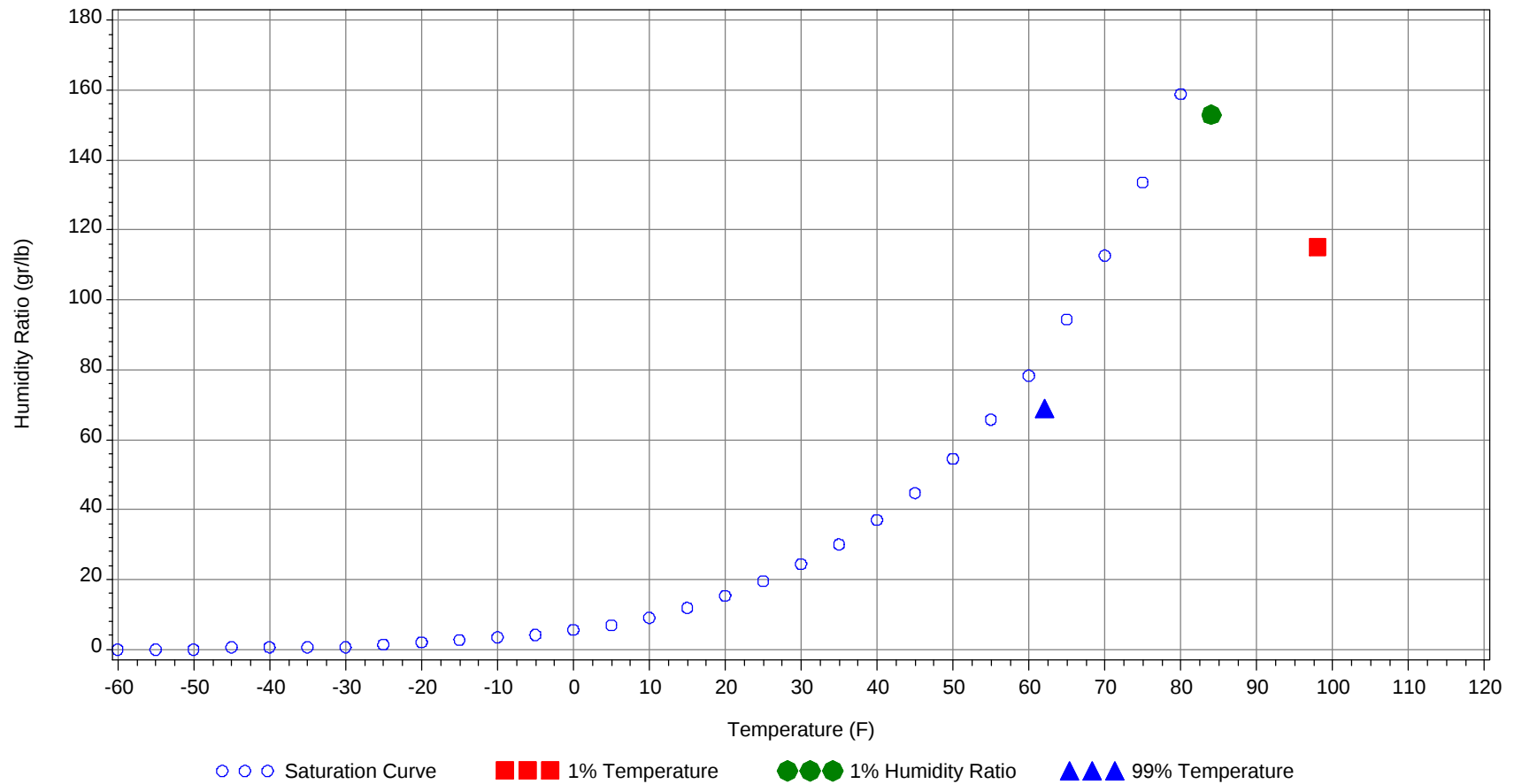
# Average Annual Climate



# Long Term Psychrometric Summary



## Psychrometric Summary of Peak Design Values



|                     | (° F) /<br>(gr/lb) | MCDB<br>(° F) | MCWB<br>(° F) | MCDP<br>(° F) | MCHR<br>(gr/lb) | Enthalpy<br>(btu/lb) |
|---------------------|--------------------|---------------|---------------|---------------|-----------------|----------------------|
| 1.0% Dry Bulb       | 98.0               |               | 78            |               | 115.0           | 41.6                 |
| 99.0% Dry Bulb      | 62.0               |               |               |               | 69.0            | 25.5                 |
| 1.0% Humidity Ratio | 153.0              | 84.0          | 80            | 78.8          |                 | 44.0                 |

### ***Dry-Bulb Temperature Hours For An Average Year***

|                            | January               |                       |                       |              |                           | February              |                       |                       |              |                           | March                 |                       |                       |              |                           |
|----------------------------|-----------------------|-----------------------|-----------------------|--------------|---------------------------|-----------------------|-----------------------|-----------------------|--------------|---------------------------|-----------------------|-----------------------|-----------------------|--------------|---------------------------|
| Temperature Range<br>(° F) | 01<br>To<br>08<br>LST | 09<br>To<br>16<br>LST | 17<br>to<br>00<br>LST | Total<br>Obs | M<br>C<br>W<br>B<br>(° F) | 01<br>To<br>08<br>LST | 09<br>To<br>16<br>LST | 17<br>to<br>00<br>LST | Total<br>Obs | M<br>C<br>W<br>B<br>(° F) | 01<br>To<br>08<br>LST | 09<br>To<br>16<br>LST | 17<br>to<br>00<br>LST | Total<br>Obs | M<br>C<br>W<br>B<br>(° F) |
| 105/109                    |                       |                       |                       |              |                           |                       |                       |                       |              |                           |                       |                       |                       |              |                           |
| 100/104                    |                       |                       |                       |              |                           |                       | 0                     |                       | 0            | 75.9                      |                       | 9                     | 1                     | 10           | 78                        |
| 95/ 99                     |                       | 3                     |                       | 3            | 74.7                      |                       | 22                    | 3                     | 25           | 75.3                      | 0                     | 65                    | 16                    | 81           | 76.8                      |
| 90/ 94                     |                       | 46                    | 7                     | 53           | 73.1                      |                       | 64                    | 24                    | 88           | 74.1                      | 0                     | 73                    | 43                    | 116          | 75.8                      |
| 85/ 89                     | 0                     | 68                    | 26                    | 94           | 71.4                      | 0                     | 53                    | 39                    | 92           | 72.5                      | 3                     | 48                    | 59                    | 110          | 74.7                      |
| 80/ 84                     | 1                     | 61                    | 54                    | 116          | 69.8                      | 10                    | 44                    | 60                    | 114          | 71.4                      | 64                    | 31                    | 71                    | 166          | 73.6                      |
| 75/ 79                     | 20                    | 40                    | 69                    | 129          | 68.5                      | 58                    | 25                    | 53                    | 136          | 70                        | 97                    | 15                    | 40                    | 152          | 71.6                      |
| 70/ 74                     | 68                    | 22                    | 57                    | 147          | 66.2                      | 67                    | 11                    | 28                    | 106          | 66.6                      | 51                    | 5                     | 14                    | 70           | 67.1                      |
| 65/ 69                     | 86                    | 7                     | 25                    | 118          | 63                        | 48                    | 3                     | 13                    | 64           | 62.5                      | 24                    | 1                     | 4                     | 29           | 62.4                      |
| 60/ 64                     | 58                    | 1                     | 9                     | 68           | 59.2                      | 35                    | 0                     | 4                     | 39           | 59.1                      | 8                     | 0                     | 1                     | 9            | 58.6                      |
| 55/ 59                     | 15                    |                       | 1                     | 16           | 54.9                      | 6                     |                       | 0                     | 6            | 55.2                      | 0                     |                       | 0                     | 0            | 54.6                      |
| 50/ 54                     | 0                     |                       |                       | 0            | 51.4                      | 0                     |                       |                       | 0            | 50.4                      |                       |                       |                       |              |                           |

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<br>(° 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) |
| 105/109                    |              | 1            |              | 1         | 78.3          |              |              |              |           |               |              |              |              |           |               |
| 100/104                    |              | 23           | 3            | 26        | 78.3          |              | 7            | 0            | 7         | 79.4          |              | 0            | 0            | 0         | 80.1          |
| 95/ 99                     | 0            | 68           | 21           | 89        | 78.2          |              | 42           | 8            | 50        | 79.1          |              | 12           | 2            | 14        | 79.7          |
| 90/ 94                     | 1            | 75           | 46           | 122       | 77.4          | 0            | 87           | 32           | 119       | 78.7          | 0            | 81           | 23           | 104       | 79.2          |
| 85/ 89                     | 21           | 45           | 66           | 132       | 76.5          | 11           | 69           | 60           | 140       | 78.1          | 4            | 89           | 55           | 148       | 78.5          |
| 80/ 84                     | 101          | 21           | 68           | 190       | 75.5          | 99           | 35           | 89           | 223       | 77            | 92           | 48           | 97           | 237       | 77.5          |
| 75/ 79                     | 93           | 7            | 32           | 132       | 73.7          | 128          | 8            | 56           | 192       | 75.4          | 140          | 9            | 62           | 211       | 75.8          |
| 70/ 74                     | 22           | 1            | 4            | 27        | 69.2          | 10           | 0            | 2            | 12        | 72.1          | 5            | 0            | 1            | 6         | 73.1          |
| 65/ 69                     | 2            |              | 0            | 2         | 62.9          |              |              |              |           |               |              |              |              |           |               |
| 60/ 64                     | 0            |              |              | 0         | 61.5          |              |              |              |           |               |              |              |              |           |               |
| 55/ 59                     |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 50/ 54                     |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |

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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) |
| 105/109                 |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 100/104                 |              | 0            | 0            | 0         | 80            |              |              |              |           |               |              |              |              |           |               |
| 95/ 99                  | 0            | 3            | 1            | 4         | 79            |              | 1            | 0            | 1         | 80.2          |              | 1            |              | 1         | 80.5          |
| 90/ 94                  | 0            | 63           | 15           | 78        | 79            | 0            | 49           | 9            | 58        | 79.3          |              | 41           | 5            | 46        | 79.3          |
| 85/ 89                  | 2            | 100          | 51           | 153       | 78.3          | 1            | 107          | 46           | 154       | 78.6          | 0            | 102          | 32           | 134       | 78.5          |
| 80/ 84                  | 71           | 67           | 101          | 239       | 77.4          | 64           | 75           | 111          | 250       | 77.7          | 41           | 77           | 105          | 223       | 77.7          |
| 75/ 79                  | 167          | 15           | 78           | 260       | 75.7          | 176          | 17           | 79           | 272       | 75.9          | 186          | 17           | 95           | 298       | 75.8          |
| 70/ 74                  | 8            | 0            | 3            | 11        | 73            | 8            | 0            | 3            | 11        | 73.2          | 13           | 2            | 4            | 19        | 72.4          |
| 65/ 69                  | 0            |              |              | 0         | 69            |              |              |              |           |               | 0            |              |              | 0         | 67            |
| 60/ 64                  |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 55/ 59                  |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 50/ 54                  |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |

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### ***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 | 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) |
| 105/109                 |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 100/104                 |              |              |              |           |               |              |              |              |           |               |              |              |              |           |               |
| 95/ 99                  |              | 0            |              | 0         | 79            |              | 3            |              | 3         | 77.9          |              | 1            |              | 1         | 77.1          |
| 90/ 94                  |              | 49           | 2            | 51        | 77.5          |              | 48           | 4            | 52        | 76.4          |              | 31           | 3            | 34        | 74.6          |
| 85/ 89                  | 0            | 104          | 25           | 129       | 76.7          | 0            | 80           | 19           | 99        | 74.7          | 0            | 67           | 14           | 81        | 72.4          |
| 80/ 84                  | 15           | 71           | 90           | 176       | 75.8          | 7            | 69           | 61           | 137       | 73            | 1            | 72           | 45           | 118       | 70.6          |
| 75/ 79                  | 147          | 21           | 113          | 281       | 74.1          | 61           | 30           | 89           | 180       | 71.6          | 19           | 49           | 74           | 142       | 68.8          |
| 70/ 74                  | 77           | 3            | 17           | 97        | 69.9          | 106          | 9            | 52           | 167       | 68.1          | 78           | 22           | 68           | 168       | 66.6          |
| 65/ 69                  | 8            |              | 2            | 10        | 64.6          | 54           | 1            | 14           | 69        | 63.9          | 89           | 6            | 33           | 128       | 63.2          |
| 60/ 64                  | 1            |              |              | 1         | 60.2          | 11           |              | 1            | 12        | 60            | 50           | 1            | 11           | 62        | 59.2          |
| 55/ 59                  |              |              |              |           |               | 1            |              |              | 1         | 56.1          | 10           | 0            | 1            | 11        | 54.9          |
| 50/ 54                  |              |              |              |           |               |              |              |              |           |               | 1            |              | 0            | 1         | 48.7          |

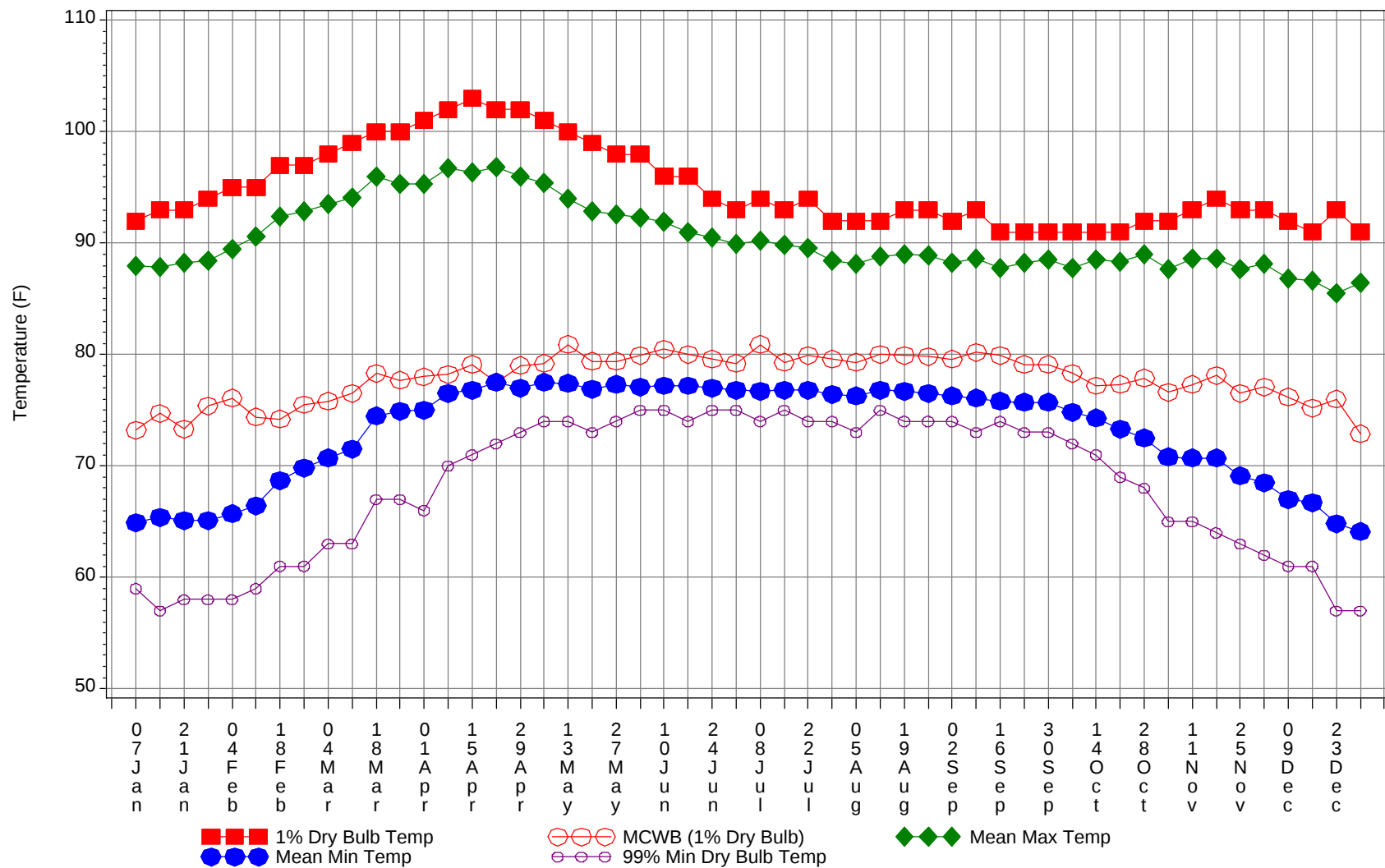
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary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

## ***Dry-Bulb Temperature Hours For An Average Year***

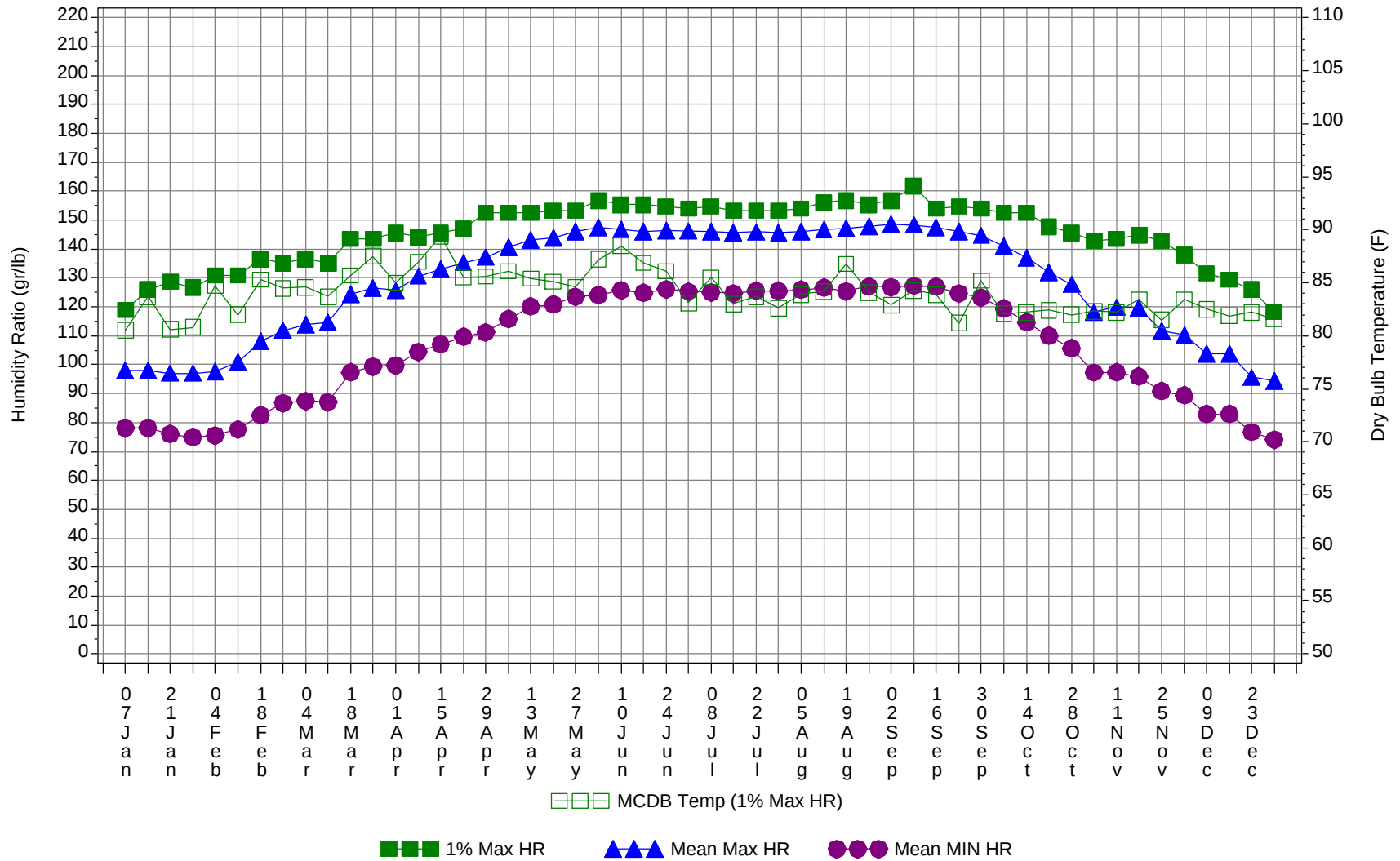
|                            | Annual       |              |              |           |                  |
|----------------------------|--------------|--------------|--------------|-----------|------------------|
| Temperature Range<br>(° F) | 01 To 08 LST | 09 To 16 LST | 17 to 00 LST | Total Obs | M C W B<br>(° F) |
| 105/109                    |              | 1            |              | 1         | 78.3             |
| 100/104                    |              | 40           | 4            | 44        | 78.4             |
| 95/ 99                     | 0            | 220          | 51           | 271       | 77.7             |
| 90/ 94                     | 1            | 708          | 211          | 920       | 77.2             |
| 85/ 89                     | 42           | 932          | 491          | 1465      | 76.4             |
| 80/ 84                     | 564          | 669          | 951          | 2184      | 75.5             |
| 75/ 79                     | 1293         | 253          | 840          | 2386      | 73.7             |
| 70/ 74                     | 511          | 76           | 253          | 840       | 67.8             |
| 65/ 69                     | 311          | 18           | 91           | 420       | 63.1             |
| 60/ 64                     | 164          | 3            | 26           | 193       | 59.2             |
| 55/ 59                     | 32           | 0            | 2            | 34        | 55               |
| 50/ 54                     | 1            |              | 0            | 1         | 49.5             |

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# Annual Summary of Temperatures



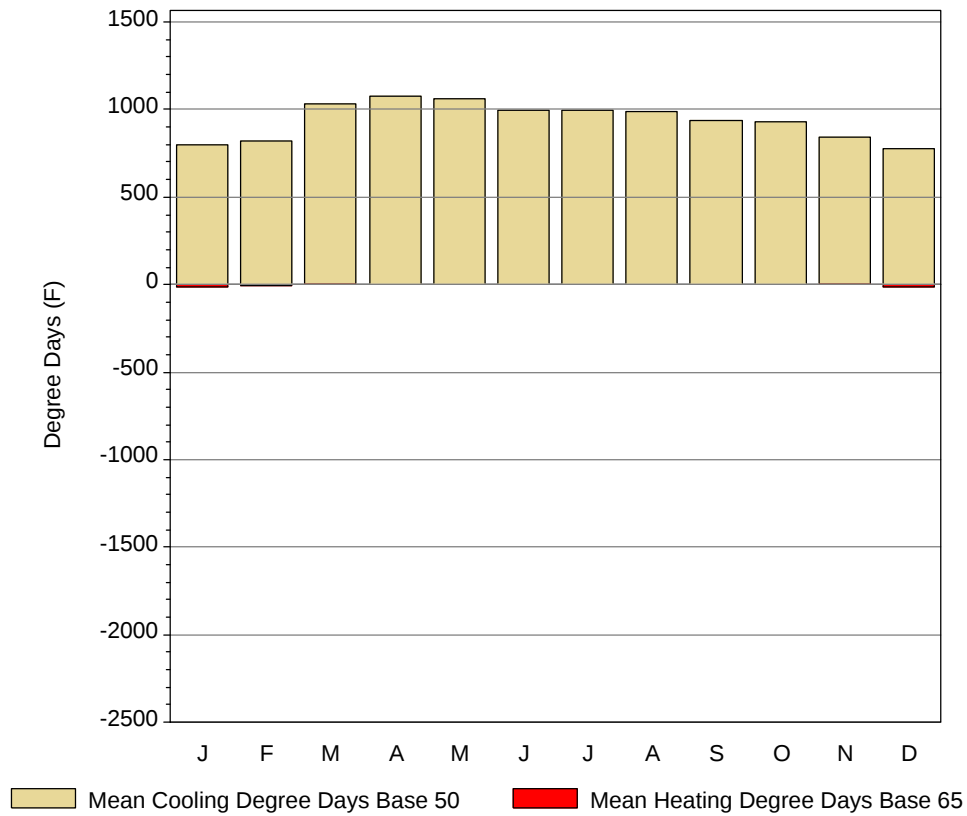
# Long Term Humidity and Dry Bulb Temperature Summary



**Long Term Humidity and Dry Bulb Temperature Summary**

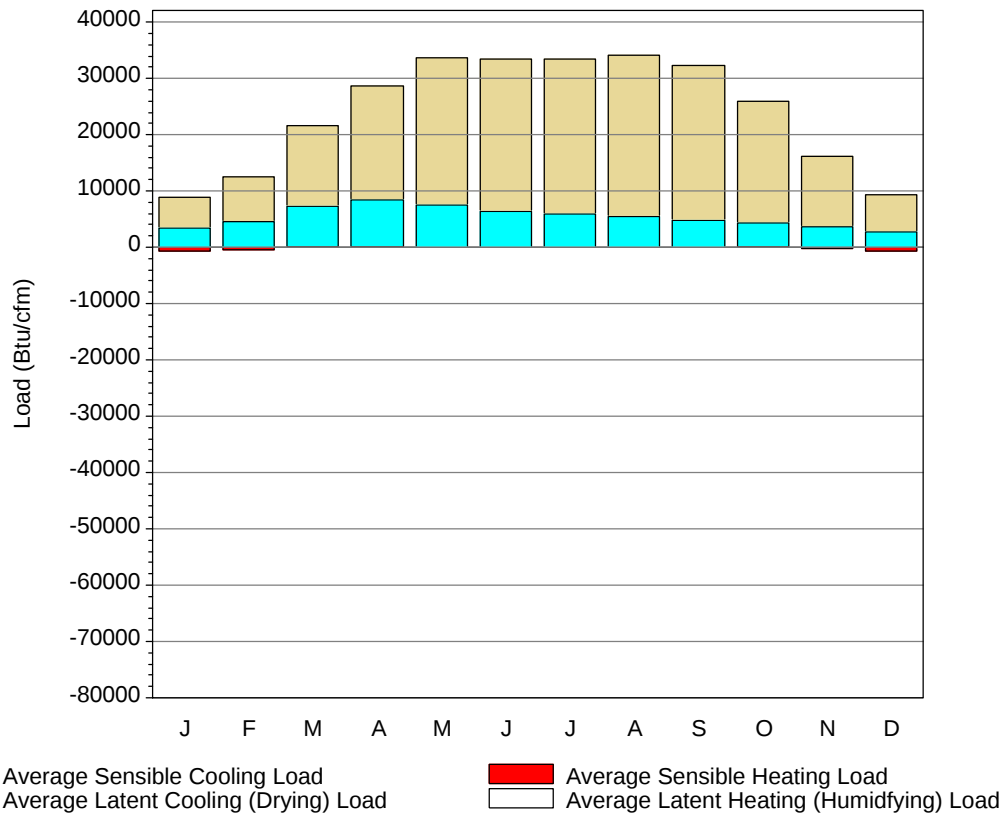
| Week<br>Ending | 1.0%<br>Temp<br>(° F) | MCWB@<br>1% Temp<br>(° F) | Mean<br>Max<br>Temp<br>(° F) | Mean<br>Min<br>Temp<br>(° F) | 99%<br>Temp<br>(° F) | 1.0%<br>HR<br>(gr/lb) | MCDB@<br>1% HR<br>(° F) | Mean<br>Max<br>HR<br>(gr/lb) | Mean<br>Min<br>HR<br>(gr/lb) |
|----------------|-----------------------|---------------------------|------------------------------|------------------------------|----------------------|-----------------------|-------------------------|------------------------------|------------------------------|
| 7-Jan          | 92                    | 73.2                      | 88                           | 64.9                         | 59                   | 119                   | 80.5                    | 97.9                         | 78.1                         |
| 14-Jan         | 93                    | 74.7                      | 87.9                         | 65.4                         | 57                   | 126                   | 83.7                    | 98.1                         | 78                           |
| 21-Jan         | 93                    | 73.3                      | 88.2                         | 65.1                         | 58                   | 128.8                 | 80.6                    | 97.1                         | 76                           |
| 28-Jan         | 94                    | 75.4                      | 88.4                         | 65.1                         | 58                   | 126.7                 | 80.8                    | 97.1                         | 74.9                         |
| 4-Feb          | 95                    | 76.1                      | 89.5                         | 65.7                         | 58                   | 130.9                 | 84.7                    | 97.8                         | 75.6                         |
| 11-Feb         | 95                    | 74.4                      | 90.6                         | 66.4                         | 59                   | 130.9                 | 82                      | 100.8                        | 77.6                         |
| 18-Feb         | 97                    | 74.2                      | 92.4                         | 68.7                         | 61                   | 136.5                 | 85.3                    | 108.2                        | 82.5                         |
| 25-Feb         | 97                    | 75.5                      | 92.9                         | 69.8                         | 61                   | 135.1                 | 84.5                    | 111.9                        | 86.7                         |
| 4-Mar          | 98                    | 75.8                      | 93.5                         | 70.7                         | 63                   | 136.5                 | 84.6                    | 114                          | 87.4                         |
| 11-Mar         | 99                    | 76.5                      | 94.1                         | 71.5                         | 63                   | 135.1                 | 83.7                    | 114.6                        | 87                           |
| 18-Mar         | 100                   | 78.3                      | 96                           | 74.5                         | 67                   | 143.5                 | 85.7                    | 124.3                        | 97.4                         |
| 25-Mar         | 100                   | 77.7                      | 95.3                         | 74.9                         | 67                   | 143.5                 | 87.5                    | 126.7                        | 99.3                         |
| 1-Apr          | 101                   | 78                        | 95.3                         | 75                           | 66                   | 145.6                 | 85                      | 125.7                        | 99.7                         |
| 8-Apr          | 102                   | 78.2                      | 96.7                         | 76.5                         | 70                   | 144.2                 | 87                      | 130.7                        | 104.4                        |
| 15-Apr         | 103                   | 79.1                      | 96.4                         | 76.8                         | 71                   | 145.6                 | 89.4                    | 133                          | 107.2                        |
| 22-Apr         | 102                   | 77.5                      | 96.8                         | 77.5                         | 72                   | 147                   | 85.5                    | 135.4                        | 109.7                        |
| 29-Apr         | 102                   | 79                        | 96                           | 77                           | 73                   | 152.6                 | 85.6                    | 137.2                        | 111.2                        |
| 6-May          | 101                   | 79.2                      | 95.4                         | 77.5                         | 74                   | 152.6                 | 86.1                    | 140.6                        | 115.8                        |
| 13-May         | 100                   | 80.9                      | 94                           | 77.4                         | 74                   | 152.6                 | 85.4                    | 143.3                        | 120.1                        |
| 20-May         | 99                    | 79.4                      | 92.9                         | 76.9                         | 73                   | 153.3                 | 85.1                    | 143.8                        | 120.9                        |
| 27-May         | 98                    | 79.4                      | 92.6                         | 77.3                         | 74                   | 153.3                 | 84.6                    | 146.2                        | 123.5                        |
| 4-Jun          | 98                    | 79.9                      | 92.3                         | 77.1                         | 75                   | 156.8                 | 87.2                    | 147.6                        | 124.2                        |
| 10-Jun         | 96                    | 80.5                      | 91.9                         | 77.2                         | 75                   | 155.4                 | 88.5                    | 146.8                        | 125.7                        |
| 17-Jun         | 96                    | 80                        | 91                           | 77.2                         | 74                   | 155.4                 | 86.9                    | 146.2                        | 124.9                        |
| 24-Jun         | 94                    | 79.6                      | 90.5                         | 77                           | 75                   | 154.7                 | 86.1                    | 146.5                        | 126.1                        |
| 1-Jul          | 93                    | 79.2                      | 89.9                         | 76.8                         | 75                   | 154                   | 83.1                    | 146.3                        | 125.3                        |
| 8-Jul          | 94                    | 80.9                      | 90.2                         | 76.7                         | 74                   | 154.7                 | 85.5                    | 146.1                        | 125                          |
| 15-Jul         | 93                    | 79.3                      | 89.8                         | 76.8                         | 75                   | 153.3                 | 83                      | 145.8                        | 124.6                        |
| 22-Jul         | 94                    | 79.9                      | 89.6                         | 76.8                         | 74                   | 153.3                 | 83.7                    | 145.9                        | 125.6                        |
| 29-Jul         | 92                    | 79.6                      | 88.4                         | 76.4                         | 74                   | 153.3                 | 82.6                    | 145.8                        | 125.6                        |
| 5-Aug          | 92                    | 79.3                      | 88.1                         | 76.3                         | 73                   | 154                   | 83.9                    | 146.2                        | 126                          |
| 12-Aug         | 92                    | 80                        | 88.8                         | 76.8                         | 75                   | 156.1                 | 84.2                    | 146.9                        | 126.7                        |
| 19-Aug         | 93                    | 79.9                      | 89                           | 76.7                         | 74                   | 156.8                 | 86.8                    | 147.2                        | 125.4                        |
| 26-Aug         | 93                    | 79.8                      | 88.9                         | 76.5                         | 74                   | 155.4                 | 84.1                    | 148                          | 127.1                        |
| 2-Sep          | 92                    | 79.6                      | 88.2                         | 76.3                         | 74                   | 156.8                 | 82.9                    | 148.6                        | 126.8                        |
| 9-Sep          | 93                    | 80.2                      | 88.6                         | 76.1                         | 73                   | 161.7                 | 84.3                    | 148.4                        | 127.3                        |
| 16-Sep         | 91                    | 79.9                      | 87.8                         | 75.8                         | 74                   | 154                   | 83.9                    | 147.4                        | 127                          |
| 23-Sep         | 91                    | 79.1                      | 88.2                         | 75.7                         | 73                   | 154.7                 | 81.2                    | 146                          | 124.7                        |
| 30-Sep         | 91                    | 79.1                      | 88.5                         | 75.7                         | 73                   | 154                   | 85.2                    | 144.8                        | 123.3                        |
| 7-Oct          | 91                    | 78.3                      | 87.8                         | 74.8                         | 72                   | 152.6                 | 82.1                    | 141                          | 119.4                        |
| 14-Oct         | 91                    | 77.2                      | 88.5                         | 74.3                         | 71                   | 152.6                 | 82.2                    | 137.1                        | 114.8                        |
| 21-Oct         | 91                    | 77.3                      | 88.3                         | 73.3                         | 69                   | 147.7                 | 82.4                    | 132                          | 110.1                        |
| 28-Oct         | 92                    | 77.9                      | 89                           | 72.5                         | 68                   | 145.6                 | 82                      | 127.8                        | 105.7                        |
| 4-Nov          | 92                    | 76.6                      | 87.7                         | 70.8                         | 65                   | 142.8                 | 82.3                    | 118.1                        | 97.3                         |
| 11-Nov         | 93                    | 77.3                      | 88.6                         | 70.7                         | 65                   | 143.5                 | 82.2                    | 119.9                        | 97.4                         |
| 18-Nov         | 94                    | 78.1                      | 88.6                         | 70.7                         | 64                   | 144.9                 | 83.4                    | 119.7                        | 95.9                         |
| 25-Nov         | 93                    | 76.5                      | 87.7                         | 69.1                         | 63                   | 142.8                 | 81.5                    | 111.7                        | 90.9                         |
| 2-Dec          | 93                    | 77.1                      | 88.1                         | 68.5                         | 62                   | 137.9                 | 83.4                    | 110.3                        | 89.4                         |
| 9-Dec          | 92                    | 76.2                      | 86.8                         | 67                           | 61                   | 131.6                 | 82.5                    | 103.8                        | 82.9                         |
| 16-Dec         | 91                    | 75.2                      | 86.6                         | 66.7                         | 61                   | 129.5                 | 81.9                    | 103.8                        | 83                           |
| 23-Dec         | 93                    | 76                        | 85.5                         | 64.8                         | 57                   | 126                   | 82.2                    | 95.7                         | 76.7                         |
| 31-Dec         | 91                    | 72.9                      | 86.4                         | 64.1                         | 57                   | 118.3                 | 81.6                    | 94.5                         | 74                           |

## Degree Days, Heating and Cooling (Base 65 F) & Cooling (Base 50F)



|       | Mean<br>Cooling<br>Degree<br>Days<br>(°F)<br>Base 50 | Mean<br>Cooling<br>Degree<br>Days<br>(°F)<br>Base 65 | Mean<br>Heating<br>Degree<br>Days<br>(°F)<br>Base 65 |
|-------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| Month |                                                      |                                                      |                                                      |
| JAN   | 799.7                                                | 346.4                                                | 11.6                                                 |
| FEB   | 823.3                                                | 405.1                                                | 5.8                                                  |
| MAR   | 1033.4                                               | 569.2                                                | 0.9                                                  |
| APR   | 1075                                                 | 625                                                  | 0                                                    |
| MAY   | 1061.9                                               | 596.9                                                | 0                                                    |
| JUN   | 995.1                                                | 545.1                                                | 0                                                    |
| JUL   | 998.9                                                | 533.9                                                | 0                                                    |
| AUG   | 986.2                                                | 521.2                                                | 0                                                    |
| SEP   | 936.9                                                | 486.9                                                | 0                                                    |
| OCT   | 933.3                                                | 468.3                                                | 0                                                    |
| NOV   | 841.6                                                | 392.7                                                | 1.1                                                  |
| DEC   | 778.9                                                | 323.8                                                | 9.8                                                  |
| ANN   | 11264.2                                              | 5814.5                                               | 29.2                                                 |

## 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   | 3353                                    | -705                                    | 5439                                  | 0                                     |
| FEB   | 4553                                    | -370                                    | 7882                                  | 0                                     |
| MAR   | 7283                                    | -81                                     | 14262                                 | 0                                     |
| APR   | 8509                                    | -1                                      | 20049                                 | 0                                     |
| MAY   | 7457                                    | 0                                       | 26129                                 | 0                                     |
| JUN   | 6364                                    | 0                                       | 27141                                 | 0                                     |
| JUL   | 5819                                    | 0                                       | 27649                                 | 0                                     |
| AUG   | 5494                                    | 0                                       | 28549                                 | 0                                     |
| SEP   | 4881                                    | 0                                       | 27379                                 | 0                                     |
| OCT   | 4430                                    | -9                                      | 21426                                 | 0                                     |
| NOV   | 3634                                    | -134                                    | 12486                                 | 0                                     |
| DEC   | 2812                                    | -634                                    | 6470                                  | 0                                     |
| ANN   | 64589                                   | -1934                                   | 224861                                | 0                                     |

| Station Information |     | Shading<br>Geometry in<br>Dimensionless<br>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<br>(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   |     |     |     |     |     |     |     |     |     |     |     |     |      |

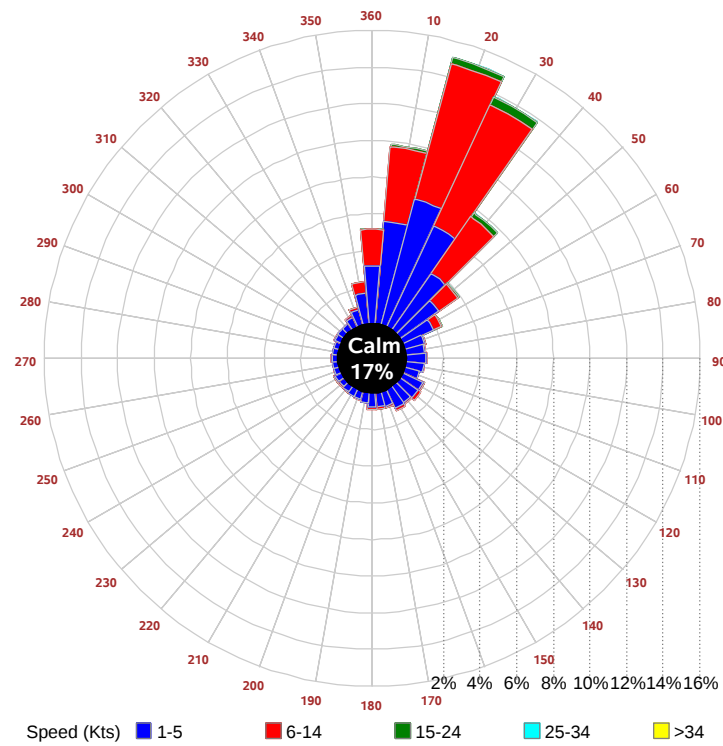
**Average Annual Solar Radiation - Nearest Available Site Source: National Renewable Energy Laboratory, Golden CO, 1995**

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

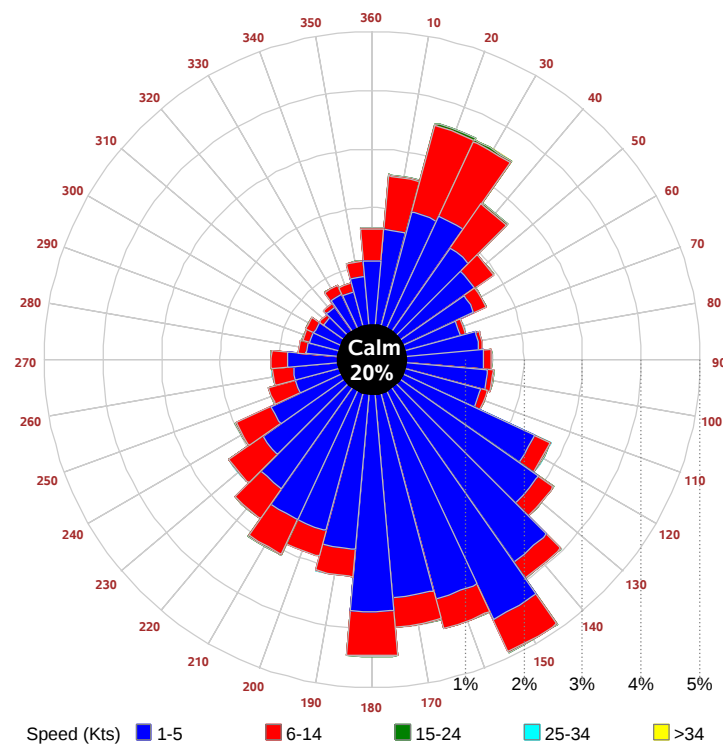
| AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9 |          |     |      |       |     |     |     |      |     |      |     |  |
|------------------------------------------------------------------------------------------------------------------|----------|-----|------|-------|-----|-----|-----|------|-----|------|-----|--|
|                                                                                                                  |          |     |      | March |     |     |     |      |     | June |     |  |
|                                                                                                                  |          | 9am | 11am | 1pm   | 3pm | 5pm | 9am | 11am | 1pm | 3pm  | 5pm |  |
| HORIZ.                                                                                                           | M.Clear  |     |      |       |     |     |     |      |     |      |     |  |
|                                                                                                                  | 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)  |     |      |      |     |     |     |      |     |     |     |  |

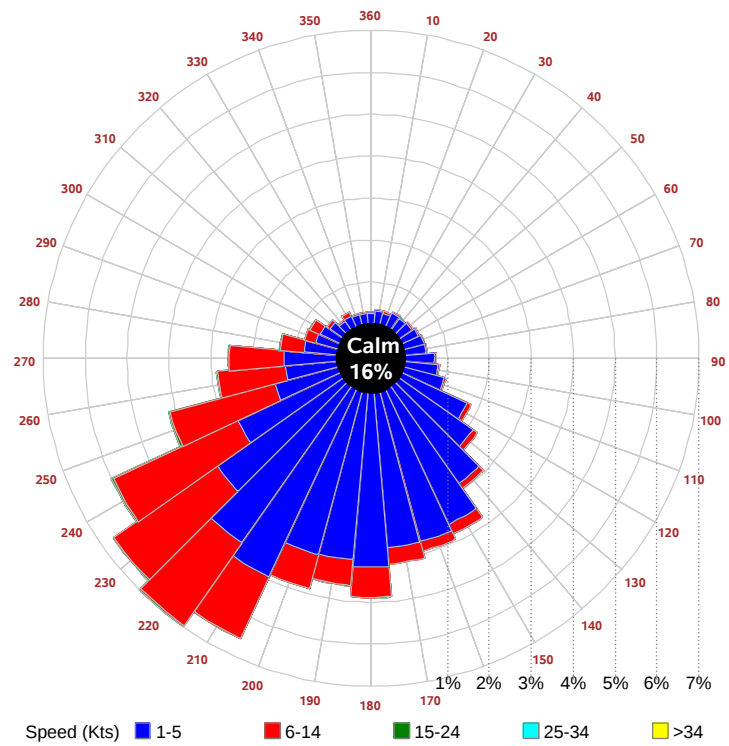
## Wind Summary - December, January, and February



## Wind Summary - March, April, and May



## Wind Summary - June, July, and August



## Wind Summary - September, October, and November

