

**RAPID CITY SD**

Latitude = 44.05 N

Longitude = 103.00 W

Period of Record = 1973 to 1996

WMO No. 726620

Elevation = 3169 feet

Average Pressure = 26.67 inches Hg

**Design Criteria Data**

|                                                  | <b>Design Value</b> | Mean Coincident (Average) Values |                         |                        |                             |
|--------------------------------------------------|---------------------|----------------------------------|-------------------------|------------------------|-----------------------------|
|                                                  |                     | Wet Bulb Temperature (°F)        | Humidity Ratio (gr/lb)  | Wind Speed (mph)       | Prevailing Direction (NSEW) |
| <b>Dry Bulb Temperature (T)</b>                  | <b>(°F)</b>         |                                  |                         |                        |                             |
| Median of Extreme Highs                          | 103                 | 67                               | 53                      | 16.6                   | S                           |
| 0.4% Occurrence                                  | 96                  | 66                               | 57                      | 13.4                   | S                           |
| 1.0% Occurrence                                  | 92                  | 65                               | 62                      | 13.1                   | S                           |
| 2.0% Occurrence                                  | 88                  | 64                               | 64                      | 12.9                   | S                           |
| Mean Daily Range                                 | 24                  | -                                | -                       | -                      | -                           |
| 97.5% Occurrence                                 | 2                   | 1                                | 4                       | 10.9                   | N                           |
| 99.0% Occurrence                                 | -6                  | -7                               | 3                       | 8.9                    | N                           |
| 99.6% Occurrence                                 | -11                 | -12                              | 2                       | 8.3                    | N                           |
| Median of Extreme Lows                           | -17                 | -17                              | 1                       | 11.1                   | NNW                         |
|                                                  | <b>Design Value</b> | Mean Coincident (Average) Values |                         |                        |                             |
|                                                  |                     | Dry Bulb Temperature (°F)        | Humidity Ratio (gr/lb)  | Wind Speed (mph)       | Prevailing Direction (NSEW) |
| <b>Wet Bulb Temperature (T<sub>wb</sub>)</b>     | <b>(°F)</b>         |                                  |                         |                        |                             |
| Median of Extreme Highs                          | 73                  | 87                               | 111                     | 11.7                   | S                           |
| 0.4% Occurrence                                  | 70                  | 86                               | 96                      | 12.1                   | S                           |
| 1.0% Occurrence                                  | 69                  | 85                               | 92                      | 12.2                   | S                           |
| 2.0% Occurrence                                  | 67                  | 82                               | 85                      | 12.1                   | S                           |
|                                                  | <b>Design Value</b> | Mean Coincident (Average) Values |                         |                        |                             |
|                                                  |                     | Dry Bulb Temperature (°F)        | Vapor Pressure (in. Hg) | Wind Speed (mph)       | Prevailing Direction (NSEW) |
| <b>Humidity Ratio (HR)</b>                       | <b>(gr/lb)</b>      |                                  |                         |                        |                             |
| Median of Extreme Highs                          | 120                 | 81                               | 0.72                    | 10.7                   | SSE                         |
| 0.4% Occurrence                                  | 107                 | 78                               | 0.65                    | 10.3                   | SE                          |
| 1.0% Occurrence                                  | 100                 | 74                               | 0.60                    | 10.1                   | SSE                         |
| 2.0% Occurrence                                  | 93                  | 73                               | 0.56                    | 10.6                   | S                           |
| <b>Air Conditioning/<br/>Humid Area Criteria</b> | <b># of Hours</b>   | T ≥ 93°F                         | T ≥ 80°F                | T <sub>wb</sub> ≥ 73°F | T <sub>wb</sub> ≥ 67°F      |
|                                                  |                     | 77                               | 587                     | 8                      | 214                         |

**Other Site Data**

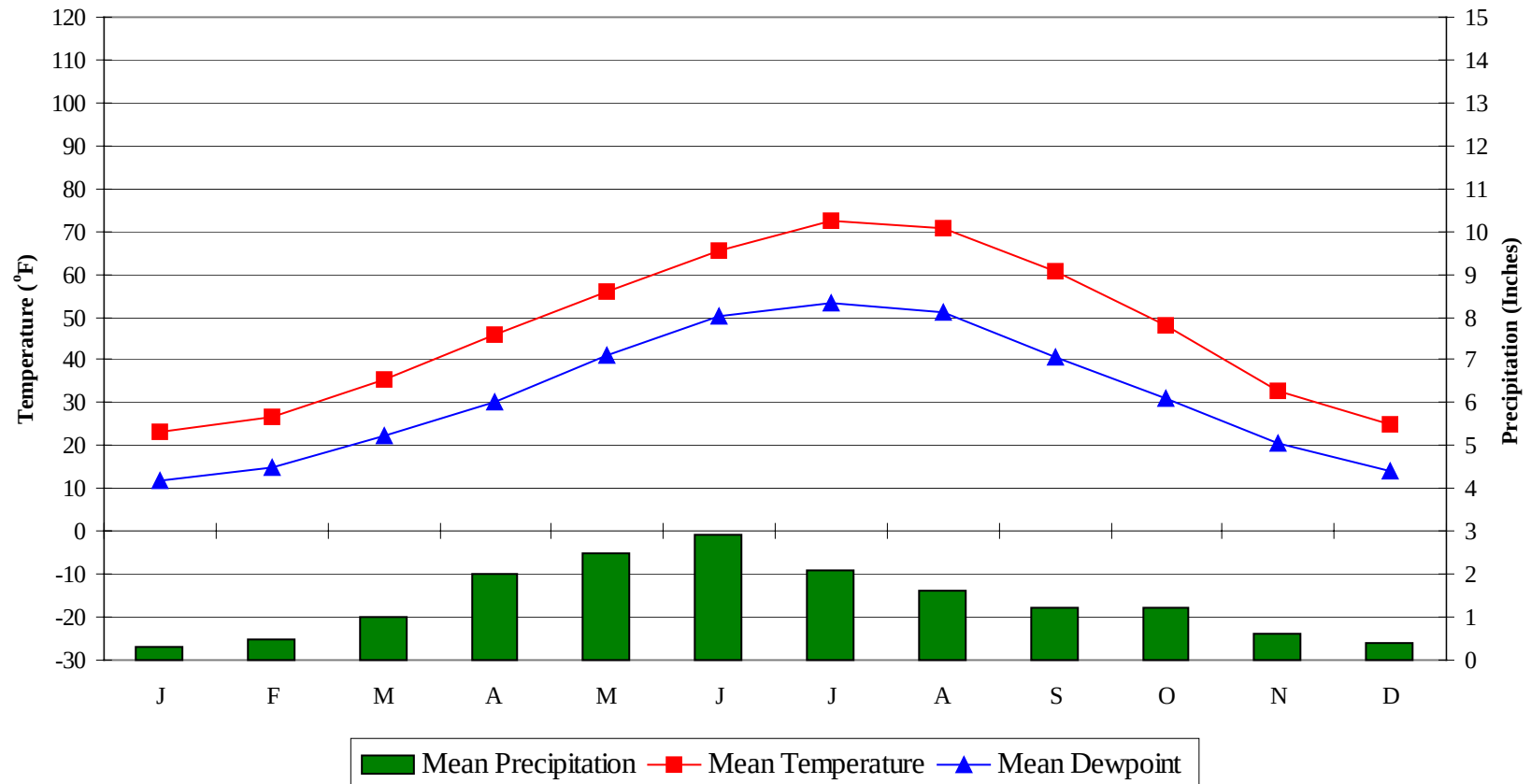
| Weather Region                                   | Rain Rate<br>100 Year Recurrence<br>(in./hr) | Basic Wind Speed<br>3 sec gust @ 33 ft<br>50 Year Recurrence (mph) | Ventilation Cooling Load Index<br>(Ton-hr/cfm/yr) Base 75°F-RH 60%<br>Latent + Sensible |
|--------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 5                                                | 2.8                                          | 90                                                                 | 0.1 + 0.6                                                                               |
| Ground Water 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>(#)                                             |
| 49.4                                             | 80                                           | 15                                                                 | 102                                                                                     |

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

RAPID CITY SD

WMO No. 726620

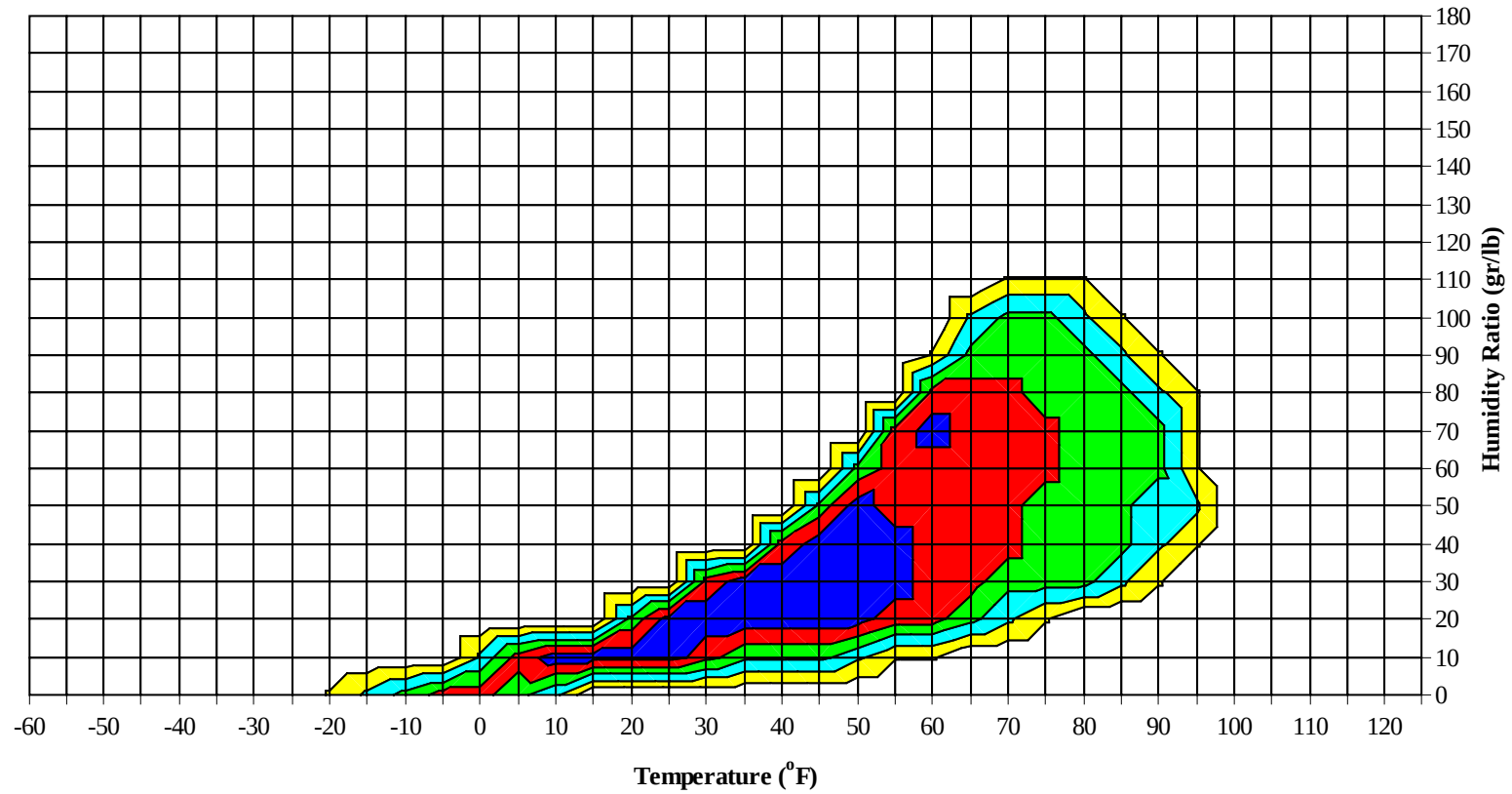
### Average Annual Climate



RAPID CITY SD

WMO No. 726620

### Long Term Psychrometric Summary

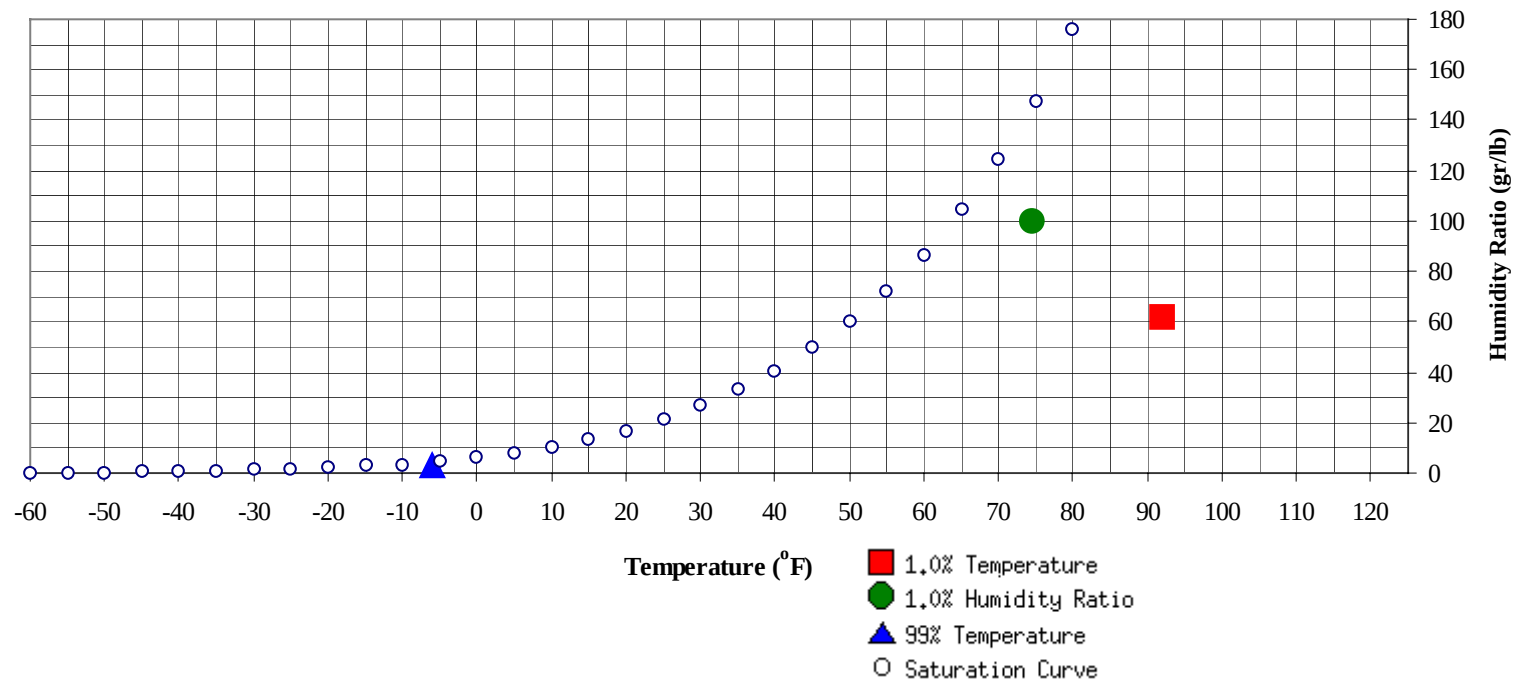


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

RAPID CITY SD

WMO No. 726620

### Psychrometric Summary of Peak Design Values



|              | (°F) | MCHR    | Enthalpy | 1.0% Humidity Ratio | (gr/lb) | MCDB | MCWB | MC Dewpt | Enthalpy |
|--------------|------|---------|----------|---------------------|---------|------|------|----------|----------|
|              |      | (gr/lb) | (btu/lb) |                     |         | (°F) | (°F) | (°F)     | (btu/lb) |
| 99% Dry Bulb | -6   | 2.9     | -1.0     |                     | 100.1   | 74.5 | 67.3 | 64.1     | 33.5     |

| 1.0% Dry Bulb | (°F) | MCHR    | MCWB | Enthalpy |
|---------------|------|---------|------|----------|
|               |      | (gr/lb) | (°F) | (btu/lb) |
|               | 92   | 62.2    | 65.3 | 31.9     |

RAPID CITY SD

WMO No. 726620

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

Period of Record = 1973 to 1996

| Temperature<br>Range<br>(°F) | January             |                |                |              |                          | February            |                |                |              |                          | March               |                |                |              |                          |
|------------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|
|                              | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) |
|                              | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          |
| 105 / 109                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 100 / 104                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 95 / 99                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 90 / 94                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 85 / 89                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 80 / 84                      |                     |                |                |              |                          |                     |                |                |              |                          |                     | 0              |                | 0            | 55.7                     |
| 75 / 79                      |                     | 0              |                | 0            | 49.0                     |                     | 0              |                | 0            | 48.0                     |                     | 2              | 0              | 2            | 52.8                     |
| 70 / 74                      |                     | 0              |                | 0            | 47.7                     |                     | 1              |                | 1            | 49.3                     |                     | 4              | 0              | 4            | 50.5                     |
| 65 / 69                      |                     | 1              |                | 1            | 46.4                     |                     | 2              | 0              | 2            | 47.2                     | 0                   | 10             | 1              | 11           | 47.9                     |
| 60 / 64                      | 0                   | 3              | 0              | 3            | 44.2                     |                     | 6              | 0              | 6            | 44.1                     | 1                   | 16             | 4              | 21           | 45.6                     |
| 55 / 59                      | 0                   | 8              | 1              | 9            | 42.4                     | 0                   | 13             | 1              | 14           | 42.2                     | 2                   | 20             | 7              | 29           | 43.2                     |
| 50 / 54                      | 1                   | 12             | 3              | 16           | 39.6                     | 1                   | 17             | 5              | 23           | 39.9                     | 4                   | 26             | 13             | 43           | 41.0                     |
| 45 / 49                      | 4                   | 20             | 4              | 28           | 37.2                     | 4                   | 24             | 11             | 39           | 37.2                     | 9                   | 31             | 21             | 61           | 38.3                     |
| 40 / 44                      | 11                  | 26             | 15             | 51           | 34.4                     | 12                  | 27             | 21             | 60           | 34.5                     | 20                  | 34             | 34             | 88           | 35.8                     |
| 35 / 39                      | 21                  | 30             | 29             | 79           | 31.5                     | 25                  | 23             | 31             | 79           | 31.7                     | 41                  | 32             | 46             | 119          | 32.8                     |
| 30 / 34                      | 34                  | 27             | 37             | 97           | 28.1                     | 33                  | 22             | 36             | 91           | 28.4                     | 58                  | 27             | 48             | 133          | 29.3                     |
| 25 / 29                      | 34                  | 22             | 34             | 90           | 24.4                     | 36                  | 18             | 31             | 85           | 24.7                     | 42                  | 15             | 29             | 86           | 24.8                     |
| 20 / 24                      | 31                  | 20             | 27             | 78           | 20.0                     | 27                  | 15             | 20             | 62           | 20.1                     | 32                  | 11             | 18             | 61           | 20.4                     |
| 15 / 19                      | 24                  | 18             | 22             | 64           | 15.5                     | 23                  | 15             | 18             | 56           | 15.6                     | 15                  | 9              | 11             | 35           | 15.9                     |
| 10 / 14                      | 21                  | 19             | 20             | 60           | 10.5                     | 17                  | 15             | 15             | 47           | 10.7                     | 10                  | 5              | 7              | 22           | 10.9                     |
| 5 / 9                        | 19                  | 17             | 17             | 53           | 5.7                      | 15                  | 11             | 12             | 38           | 6.0                      | 5                   | 3              | 4              | 12           | 6.0                      |
| 0 / 4                        | 18                  | 14             | 17             | 49           | 0.8                      | 11                  | 7              | 9              | 27           | 1.1                      | 4                   | 2              | 3              | 9            | 1.2                      |
| -5 / -1                      | 11                  | 5              | 10             | 26           | -3.2                     | 7                   | 2              | 5              | 14           | -3.3                     | 3                   | 0              | 1              | 4            | -3.1                     |
| -10 / -6                     | 10                  | 3              | 8              | 21           | -7.8                     | 7                   | 2              | 5              | 14           | -7.4                     | 1                   |                | 1              | 2            | -7.5                     |
| -15 / -11                    | 7                   | 1              | 4              | 12           | -12.3                    | 3                   | 1              | 2              | 6            | -12.2                    | 0                   |                | 0              | 0            | -11.6                    |
| -20 / -16                    | 2                   | 0              | 1              | 3            | -16.4                    | 2                   | 0              | 1              | 3            | -17.2                    | 0                   |                |                | 0            | -16.0                    |
| -25 / -21                    | 0                   | 0              | 0              | 0            | -20.7                    | 1                   | 0              | 1              | 2            | -22.0                    |                     |                |                |              |                          |
| -30 / -26                    |                     |                |                |              |                          | 0                   |                |                | 0            |                          |                     |                |                |              |                          |
| -35 / -31                    |                     |                |                |              |                          | 0                   |                |                | 0            |                          |                     |                |                |              |                          |

**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.

RAPID CITY SD

WMO No. 726620

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

Period of Record = 1973 to 1996

| Temperature<br>Range<br>(°F) | April               |                |                |              |                          | May                 |                |                |              |                          | June                |                |                |              |                          |
|------------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|
|                              | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) |
|                              | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          |
| 105 / 109                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 100 / 104                    |                     |                |                |              |                          |                     |                |                |              |                          |                     | 2              | 0              | 2            | 66.8                     |
| 95 / 99                      |                     |                |                |              |                          |                     |                |                |              |                          |                     | 3              | 1              | 4            | 65.4                     |
| 90 / 94                      |                     | 1              |                | 1            | 57.4                     |                     | 1              |                | 1            | 61.4                     | 0                   | 9              | 3              | 12           | 65.7                     |
| 85 / 89                      |                     | 2              | 0              | 2            | 56.8                     |                     | 5              | 1              | 6            | 61.1                     | 1                   | 21             | 7              | 29           | 65.6                     |
| 80 / 84                      |                     | 5              | 1              | 6            | 55.9                     | 0                   | 13             | 3              | 16           | 60.6                     | 2                   | 34             | 13             | 49           | 64.0                     |
| 75 / 79                      | 0                   | 10             | 2              | 12           | 54.1                     | 0                   | 23             | 7              | 30           | 59.1                     | 5                   | 43             | 21             | 69           | 62.3                     |
| 70 / 74                      | 0                   | 14             | 5              | 19           | 52.5                     | 2                   | 36             | 14             | 52           | 56.6                     | 14                  | 47             | 31             | 92           | 60.0                     |
| 65 / 69                      | 2                   | 19             | 8              | 29           | 50.0                     | 7                   | 40             | 23             | 70           | 54.3                     | 32                  | 35             | 41             | 108          | 57.9                     |
| 60 / 64                      | 4                   | 27             | 14             | 45           | 47.7                     | 20                  | 40             | 31             | 91           | 52.1                     | 52                  | 24             | 47             | 122          | 55.6                     |
| 55 / 59                      | 8                   | 33             | 20             | 61           | 45.1                     | 37                  | 36             | 43             | 117          | 49.6                     | 57                  | 14             | 41             | 111          | 52.7                     |
| 50 / 54                      | 18                  | 36             | 30             | 84           | 42.9                     | 53                  | 27             | 49             | 130          | 47.0                     | 47                  | 5              | 25             | 77           | 48.5                     |
| 45 / 49                      | 29                  | 29             | 35             | 93           | 40.3                     | 56                  | 16             | 40             | 113          | 43.2                     | 23                  | 2              | 10             | 35           | 44.3                     |
| 40 / 44                      | 47                  | 25             | 43             | 115          | 37.1                     | 39                  | 7              | 23             | 69           | 39.0                     | 7                   | 0              | 2              | 9            | 40.5                     |
| 35 / 39                      | 48                  | 17             | 36             | 101          | 33.7                     | 21                  | 3              | 9              | 33           | 34.5                     | 1                   |                | 0              | 1            | 36.4                     |
| 30 / 34                      | 47                  | 16             | 30             | 93           | 30.1                     | 9                   | 2              | 3              | 14           | 30.6                     |                     |                |                |              |                          |
| 25 / 29                      | 24                  | 5              | 13             | 42           | 25.3                     | 2                   |                | 0              | 2            | 26.3                     |                     |                |                |              |                          |
| 20 / 24                      | 10                  | 1              | 3              | 14           | 21.0                     | 0                   |                |                | 0            | 22.5                     |                     |                |                |              |                          |
| 15 / 19                      | 3                   | 0              | 1              | 4            | 15.7                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 10 / 14                      | 0                   | 0              | 0              | 0            | 12.0                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 5 / 9                        | 0                   |                |                | 0            | 6.8                      |                     |                |                |              |                          |                     |                |                |              |                          |
| 0 / 4                        | 0                   |                |                | 0            | 2.0                      |                     |                |                |              |                          |                     |                |                |              |                          |
| -5 / -1                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -10 / -6                     |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -15 / -11                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -20 / -16                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -25 / -21                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -30 / -26                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -35 / -31                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |

**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.

RAPID CITY SD

WMO No. 726620

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

Period of Record = 1973 to 1996

| Temperature<br>Range<br>(°F) | July                |                |                |              |                          | August              |                |                |              |                          | September           |                |                |              |                          |
|------------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|
|                              | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) |
|                              | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          |
| 105 / 109                    |                     | 1              | 0              | 1            | 66.1                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 100 / 104                    |                     | 5              | 1              | 6            | 67.0                     |                     | 2              | 0              | 2            | 66.0                     |                     | 0              |                | 0            | 64.6                     |
| 95 / 99                      | 0                   | 14             | 3              | 17           | 66.5                     |                     | 11             | 2              | 13           | 65.0                     |                     | 3              | 0              | 3            | 63.4                     |
| 90 / 94                      | 0                   | 28             | 9              | 37           | 66.3                     |                     | 27             | 7              | 34           | 64.9                     |                     | 9              | 1              | 10           | 62.3                     |
| 85 / 89                      | 1                   | 40             | 16             | 57           | 65.6                     | 1                   | 42             | 13             | 56           | 64.4                     | 0                   | 20             | 4              | 24           | 60.3                     |
| 80 / 84                      | 5                   | 52             | 26             | 83           | 64.1                     | 2                   | 51             | 21             | 74           | 63.1                     | 1                   | 28             | 7              | 36           | 59.1                     |
| 75 / 79                      | 15                  | 47             | 37             | 99           | 62.6                     | 9                   | 48             | 32             | 89           | 61.5                     | 2                   | 31             | 12             | 45           | 57.3                     |
| 70 / 74                      | 37                  | 34             | 46             | 117          | 61.1                     | 27                  | 33             | 46             | 107          | 60.2                     | 6                   | 35             | 20             | 61           | 55.7                     |
| 65 / 69                      | 58                  | 16             | 50             | 124          | 59.3                     | 55                  | 18             | 53             | 127          | 58.4                     | 14                  | 32             | 29             | 75           | 53.6                     |
| 60 / 64                      | 70                  | 7              | 37             | 114          | 57.0                     | 67                  | 9              | 43             | 120          | 56.1                     | 32                  | 31             | 38             | 101          | 51.8                     |
| 55 / 59                      | 43                  | 4              | 19             | 66           | 53.6                     | 54                  | 4              | 22             | 80           | 52.6                     | 45                  | 21             | 44             | 110          | 49.1                     |
| 50 / 54                      | 16                  | 0              | 4              | 20           | 49.5                     | 24                  | 1              | 7              | 32           | 48.2                     | 52                  | 15             | 39             | 106          | 46.1                     |
| 45 / 49                      | 2                   |                | 0              | 2            | 44.8                     | 7                   | 1              | 2              | 10           | 43.9                     | 43                  | 7              | 25             | 75           | 42.7                     |
| 40 / 44                      | 0                   |                | 0              | 0            | 41.3                     | 1                   |                | 0              | 1            | 39.0                     | 25                  | 4              | 13             | 42           | 38.3                     |
| 35 / 39                      |                     |                |                |              |                          |                     |                |                |              |                          | 12                  | 2              | 5              | 19           | 34.2                     |
| 30 / 34                      |                     |                |                |              |                          |                     |                |                |              |                          | 5                   | 1              | 4              | 10           | 29.7                     |
| 25 / 29                      |                     |                |                |              |                          |                     |                |                |              |                          | 2                   |                | 1              | 3            | 25.4                     |
| 20 / 24                      |                     |                |                |              |                          |                     |                |                |              |                          | 1                   |                |                | 1            | 20.9                     |
| 15 / 19                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 10 / 14                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 5 / 9                        |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 0 / 4                        |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -5 / -1                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -10 / -6                     |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -15 / -11                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -20 / -16                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -25 / -21                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -30 / -26                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| -35 / -31                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |

**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.

RAPID CITY SD

WMO No. 726620

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

Period of Record = 1973 to 1996

| Temperature<br>Range<br>(°F) | October             |                |                |              |                          | November            |                |                |              |                          | December            |                |                |              |                          |
|------------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|---------------------|----------------|----------------|--------------|--------------------------|
|                              | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) |
|                              | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          |
| 105 / 109                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 100 / 104                    |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 95 / 99                      |                     |                |                |              |                          |                     |                |                |              |                          |                     |                |                |              |                          |
| 90 / 94                      |                     | 1              |                | 1            | 57.5                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 85 / 89                      |                     | 3              |                | 3            | 56.3                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 80 / 84                      |                     | 8              | 1              | 9            | 55.0                     |                     |                |                |              |                          |                     |                |                |              |                          |
| 75 / 79                      | 0                   | 14             | 1              | 15           | 53.6                     |                     | 0              |                | 0            | 50.1                     |                     |                |                |              |                          |
| 70 / 74                      | 0                   | 22             | 3              | 25           | 51.8                     |                     | 4              |                | 4            | 49.8                     |                     | 0              |                | 0            | 47.0                     |
| 65 / 69                      | 2                   | 27             | 6              | 35           | 49.9                     | 0                   | 7              | 0              | 7            | 48.1                     |                     | 1              | 0              | 1            | 46.8                     |
| 60 / 64                      | 5                   | 32             | 15             | 52           | 47.7                     | 1                   | 12             | 1              | 14           | 46.5                     |                     | 4              | 0              | 4            | 44.9                     |
| 55 / 59                      | 15                  | 36             | 26             | 77           | 45.6                     | 1                   | 17             | 4              | 22           | 43.7                     | 1                   | 6              | 1              | 8            | 42.7                     |
| 50 / 54                      | 29                  | 34             | 38             | 101          | 43.3                     | 5                   | 25             | 10             | 40           | 40.9                     | 1                   | 12             | 2              | 15           | 40.0                     |
| 45 / 49                      | 42                  | 26             | 48             | 116          | 40.7                     | 13                  | 28             | 18             | 59           | 38.3                     | 3                   | 20             | 6              | 29           | 37.4                     |
| 40 / 44                      | 57                  | 19             | 45             | 121          | 37.4                     | 21                  | 29             | 26             | 76           | 35.5                     | 10                  | 31             | 16             | 57           | 34.6                     |
| 35 / 39                      | 41                  | 13             | 33             | 87           | 33.4                     | 33                  | 32             | 39             | 104          | 32.2                     | 24                  | 33             | 31             | 88           | 31.5                     |
| 30 / 34                      | 32                  | 8              | 20             | 60           | 29.5                     | 42                  | 28             | 44             | 114          | 28.8                     | 35                  | 31             | 36             | 102          | 28.0                     |
| 25 / 29                      | 15                  | 2              | 10             | 27           | 25.2                     | 42                  | 16             | 36             | 94           | 24.8                     | 39                  | 29             | 43             | 111          | 24.4                     |
| 20 / 24                      | 6                   | 0              | 3              | 9            | 20.6                     | 31                  | 14             | 24             | 69           | 20.5                     | 38                  | 24             | 33             | 95           | 20.1                     |
| 15 / 19                      | 1                   | 0              | 1              | 2            | 15.6                     | 22                  | 11             | 15             | 48           | 15.9                     | 32                  | 16             | 24             | 72           | 15.5                     |
| 10 / 14                      | 1                   | 1              | 0              | 2            | 11.8                     | 13                  | 7              | 11             | 31           | 11.0                     | 22                  | 14             | 19             | 55           | 10.7                     |
| 5 / 9                        | 0                   |                | 0              | 0            | 5.9                      | 7                   | 3              | 6              | 16           | 6.3                      | 15                  | 8              | 13             | 36           | 6.0                      |
| 0 / 4                        | 0                   |                | 0              | 0            | 2.2                      | 4                   | 2              | 3              | 9            | 1.3                      | 8                   | 7              | 9              | 24           | 1.0                      |
| -5 / -1                      | 0                   |                |                | 0            | -1.0                     | 3                   | 2              | 2              | 7            | -3.0                     | 6                   | 5              | 5              | 16           | -3.3                     |
| -10 / -6                     |                     |                |                |              |                          | 1                   | 0              | 1              | 2            | -7.0                     | 5                   | 4              | 5              | 14           | -7.4                     |
| -15 / -11                    |                     |                |                |              |                          | 1                   | 0              | 0              | 1            | -11.6                    | 3                   | 2              | 3              | 8            | -12.7                    |
| -20 / -16                    |                     |                |                |              |                          |                     |                |                |              |                          | 2                   | 1              | 2              | 5            | -17.0                    |
| -25 / -21                    |                     |                |                |              |                          |                     |                |                |              |                          | 2                   | 0              | 1              | 3            | -21.6                    |
| -30 / -26                    |                     |                |                |              |                          |                     |                |                |              |                          | 1                   |                | 0              | 1            | -26.6                    |
| -35 / -31                    |                     |                |                |              |                          |                     |                |                |              |                          | 0                   |                |                | 0            | -30.0                    |

**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.



**RAPID CITY SD**

WMO No. 726620

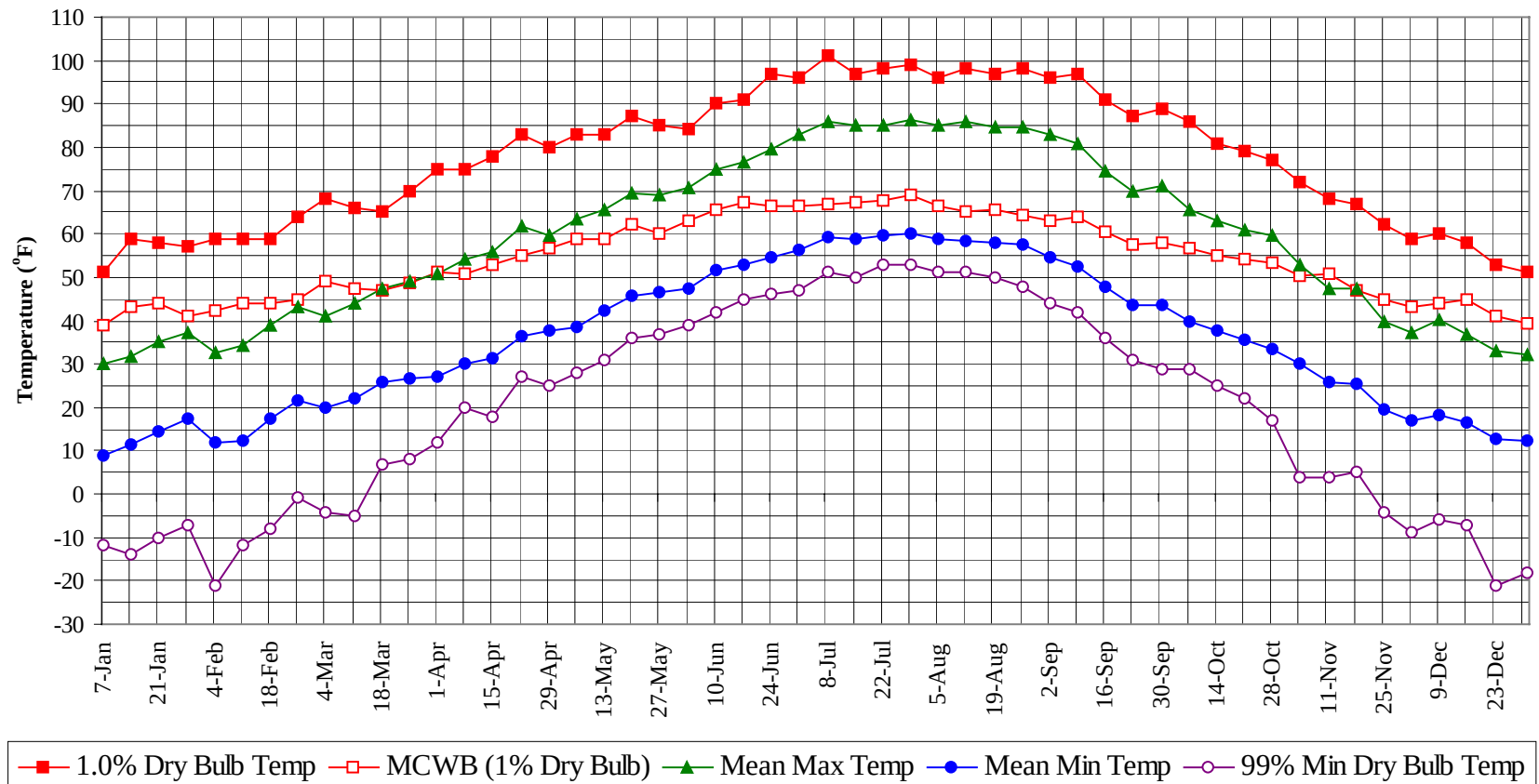
**Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)**

Period of Record = 1973 to 1996

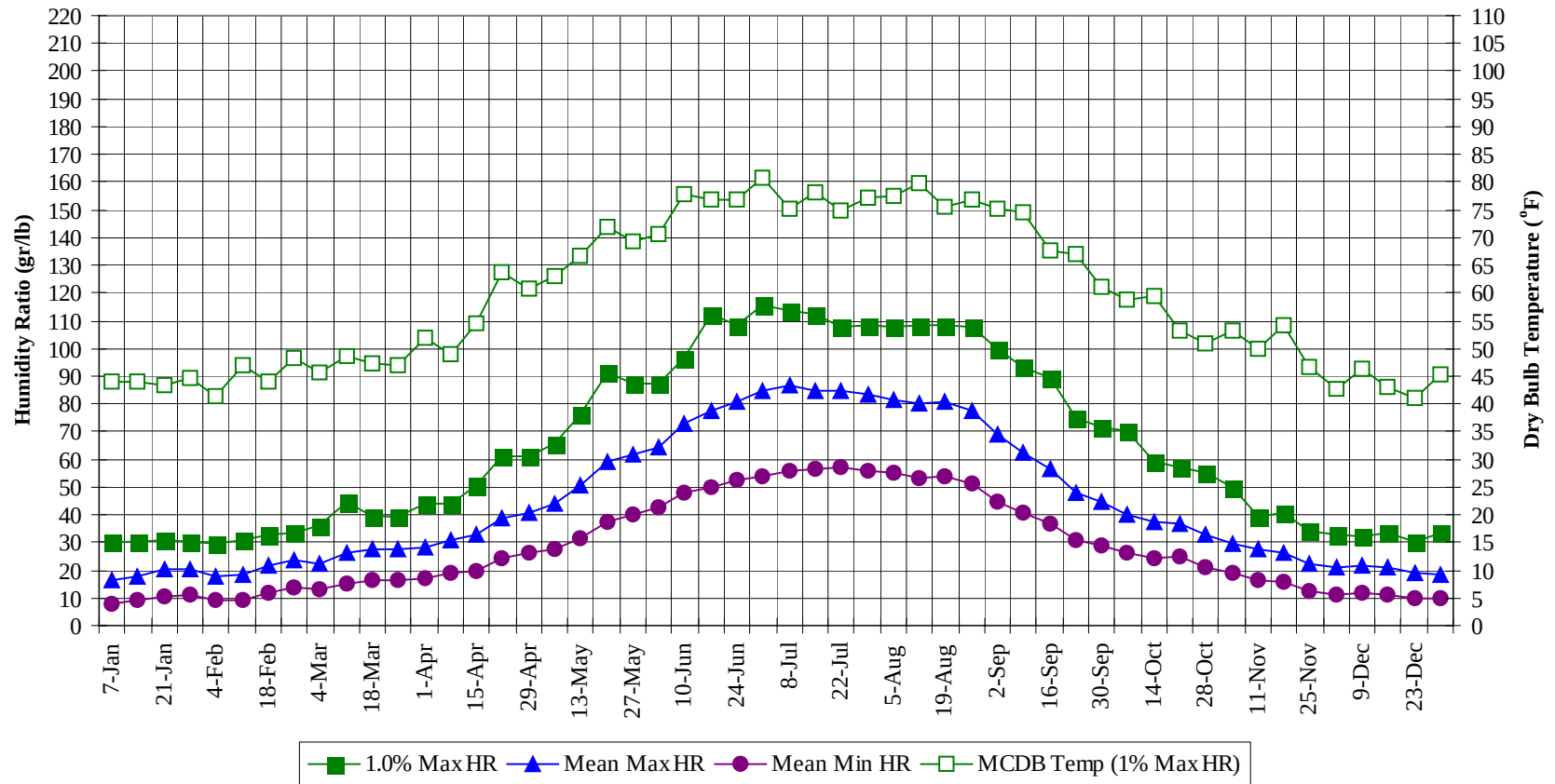
| Annual Totals                |                     |                |                |              |                          |
|------------------------------|---------------------|----------------|----------------|--------------|--------------------------|
| Temperature<br>Range<br>(°F) | Hour<br>Group (LST) |                |                | Total<br>Obs | M<br>C<br>W<br>B<br>(°F) |
|                              | 01<br>To<br>08      | 09<br>To<br>16 | 17<br>To<br>00 |              |                          |
|                              |                     |                |                |              |                          |
| 105 / 109                    |                     | 1              | 0              | 1            | 66.1                     |
| 100 / 104                    |                     | 9              | 1              | 10           | 66.6                     |
| 95 / 99                      | 0                   | 31             | 6              | 37           | 65.6                     |
| 90 / 94                      | 0                   | 75             | 19             | 94           | 65.2                     |
| 85 / 89                      | 3                   | 132            | 40             | 175          | 64.1                     |
| 80 / 84                      | 9                   | 191            | 72             | 271          | 62.5                     |
| 75 / 79                      | 32                  | 218            | 112            | 361          | 60.6                     |
| 70 / 74                      | 87                  | 231            | 165            | 483          | 58.5                     |
| 65 / 69                      | 169                 | 210            | 212            | 591          | 56.1                     |
| 60 / 64                      | 251                 | 211            | 231            | 693          | 53.1                     |
| 55 / 59                      | 261                 | 212            | 226            | 699          | 49.1                     |
| 50 / 54                      | 250                 | 212            | 222            | 684          | 44.8                     |
| 45 / 49                      | 234                 | 205            | 218            | 657          | 40.6                     |
| 40 / 44                      | 249                 | 203            | 236            | 688          | 36.5                     |
| 35 / 39                      | 268                 | 187            | 256            | 711          | 32.6                     |
| 30 / 34                      | 296                 | 161            | 258            | 716          | 28.9                     |
| 25 / 29                      | 239                 | 108            | 197            | 545          | 24.7                     |
| 20 / 24                      | 177                 | 86             | 129            | 392          | 20.2                     |
| 15 / 19                      | 121                 | 70             | 94             | 285          | 15.6                     |
| 10 / 14                      | 85                  | 60             | 74             | 219          | 10.7                     |
| 5 / 9                        | 62                  | 43             | 53             | 158          | 5.9                      |
| 0 / 4                        | 47                  | 33             | 40             | 120          | 1.0                      |
| -5 / -1                      | 30                  | 15             | 24             | 69           | -3.2                     |
| -10 / -6                     | 25                  | 10             | 20             | 55           | -7.5                     |
| -15 / -11                    | 14                  | 4              | 9              | 27           | -12.4                    |
| -20 / -16                    | 6                   | 2              | 4              | 12           | -16.9                    |
| -25 / -21                    | 4                   | 1              | 3              | 8            | -21.7                    |
| -30 / -26                    | 1                   |                | 0              | 1            | -26.6                    |
| -35 / -31                    | 0                   |                |                | 0            | -30.0                    |

**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.

## Annual Summary of Temperatures



## Long Term Humidity and Dry Bulb Temperature Summary

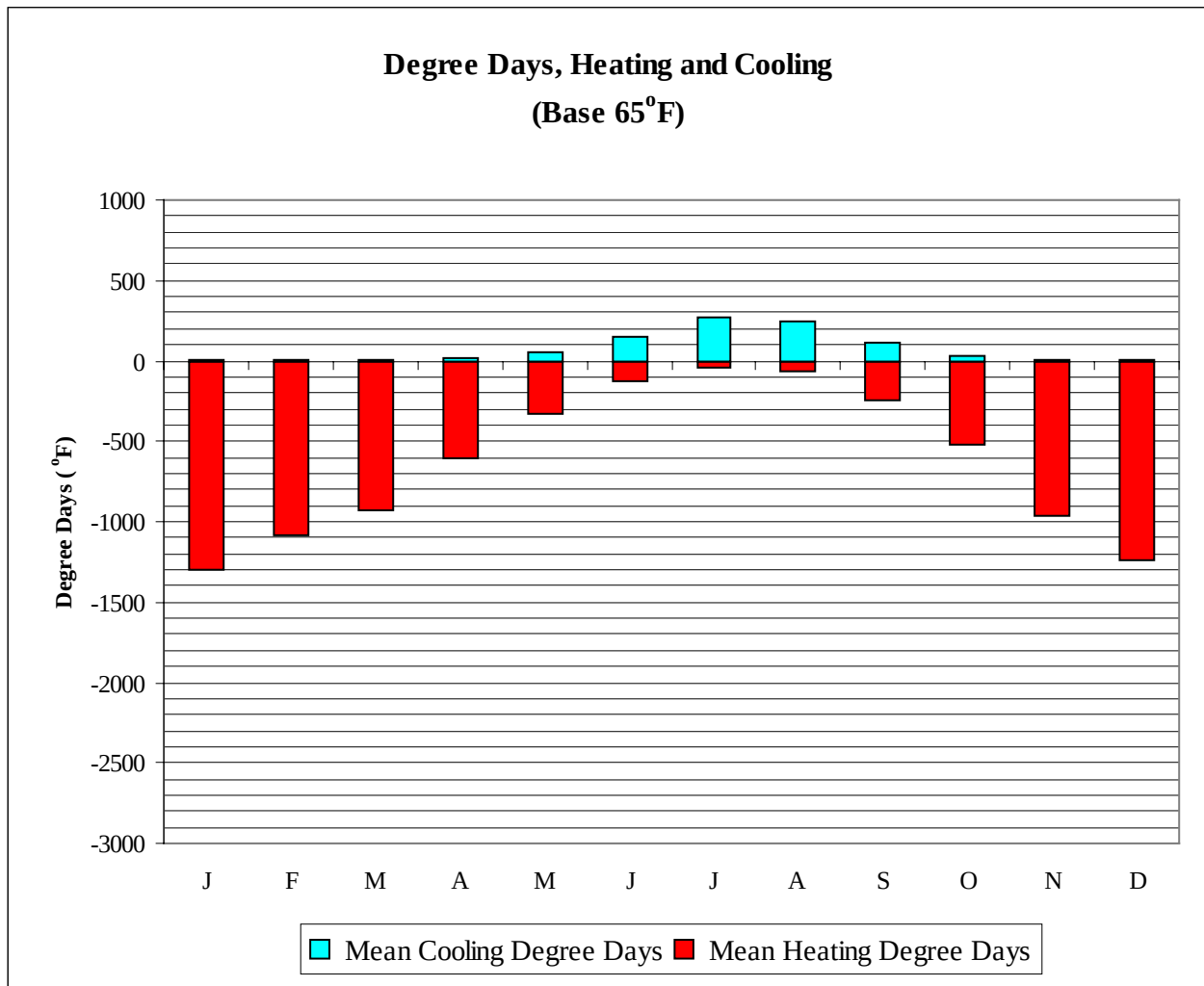


**RAPID CITY SD**

WMO No. 726620

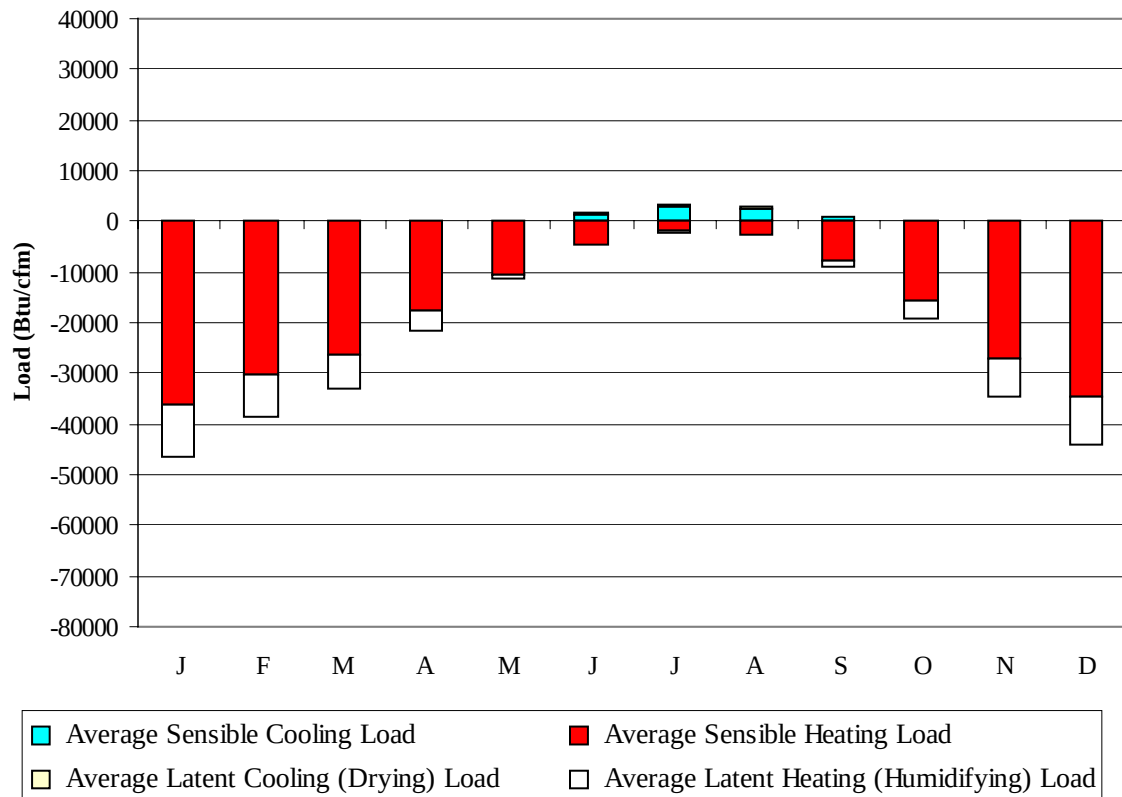
**Long Term Dry Bulb Temperature and Humidity Summary**

| 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       | 51.0           | 39.0                | 29.9               | 9.0                | -12.0         | 30.1            | 43.9              | 16.7                | 8.1                 |
| 14-Jan      | 59.0           | 43.2                | 31.9               | 11.4               | -14.0         | 30.1            | 44.0              | 17.8                | 9.2                 |
| 21-Jan      | 58.0           | 43.8                | 35.2               | 14.6               | -10.0         | 30.8            | 43.2              | 20.3                | 10.5                |
| 28-Jan      | 57.0           | 41.2                | 37.3               | 17.3               | -7.0          | 30.1            | 44.8              | 20.6                | 11.1                |
| 4-Feb       | 59.0           | 42.2                | 32.7               | 11.7               | -21.0         | 29.4            | 41.3              | 17.7                | 9.3                 |
| 11-Feb      | 59.0           | 44.0                | 34.4               | 12.2               | -12.0         | 30.8            | 47.0              | 18.2                | 9.3                 |
| 18-Feb      | 59.0           | 43.9                | 38.9               | 17.2               | -8.0          | 32.9            | 44.1              | 21.4                | 11.9                |
| 25-Feb      | 64.0           | 44.7                | 43.0               | 21.7               | -1.0          | 33.6            | 48.3              | 23.5                | 13.5                |
| 4-Mar       | 68.0           | 49.0                | 41.2               | 19.9               | -4.0          | 36.4            | 45.5              | 22.6                | 12.9                |
| 11-Mar      | 66.0           | 47.3                | 43.9               | 21.9               | -5.0          | 44.8            | 48.5              | 26.0                | 15.1                |
| 18-Mar      | 65.0           | 47.1                | 47.5               | 25.9               | 7.0           | 39.2            | 47.3              | 27.4                | 16.5                |
| 25-Mar      | 70.0           | 48.7                | 49.2               | 26.6               | 8.0           | 39.2            | 47.1              | 27.5                | 16.5                |
| 1-Apr       | 75.0           | 51.2                | 50.8               | 27.2               | 12.0          | 44.1            | 52.0              | 28.2                | 17.1                |
| 8-Apr       | 75.0           | 50.9                | 54.0               | 30.2               | 20.0          | 44.1            | 48.8              | 30.8                | 19.0                |
| 15-Apr      | 78.0           | 53.0                | 55.7               | 31.5               | 18.0          | 50.4            | 54.5              | 32.9                | 19.9                |
| 22-Apr      | 83.0           | 55.1                | 61.9               | 36.5               | 27.0          | 60.9            | 63.7              | 38.9                | 24.3                |
| 29-Apr      | 80.0           | 56.6                | 59.8               | 37.6               | 25.0          | 60.9            | 60.6              | 40.9                | 26.4                |
| 6-May       | 83.0           | 58.6                | 63.7               | 38.7               | 28.0          | 65.8            | 63.1              | 44.1                | 27.8                |
| 13-May      | 83.0           | 58.9                | 65.5               | 42.1               | 31.0          | 76.3            | 66.8              | 50.6                | 31.8                |
| 20-May      | 87.0           | 62.4                | 69.6               | 45.6               | 36.0          | 91.0            | 72.1              | 59.1                | 37.8                |
| 27-May      | 85.0           | 60.3                | 68.9               | 46.5               | 37.0          | 87.5            | 69.4              | 61.9                | 40.2                |
| 3-Jun       | 84.0           | 63.2                | 70.5               | 47.4               | 39.0          | 87.5            | 70.7              | 64.5                | 42.6                |
| 10-Jun      | 90.0           | 65.6                | 74.8               | 51.6               | 42.0          | 96.6            | 77.8              | 72.6                | 48.2                |
| 17-Jun      | 91.0           | 67.4                | 76.7               | 53.1               | 45.0          | 112.0           | 76.8              | 77.6                | 49.8                |
| 24-Jun      | 97.0           | 66.4                | 79.4               | 54.5               | 46.0          | 108.5           | 76.9              | 81.0                | 52.7                |
| 1-Jul       | 96.0           | 66.5                | 82.9               | 56.3               | 47.0          | 115.5           | 80.9              | 84.7                | 53.7                |
| 8-Jul       | 101.0          | 66.8                | 86.0               | 59.2               | 51.0          | 113.4           | 75.2              | 87.0                | 55.6                |
| 15-Jul      | 97.0           | 67.5                | 84.9               | 58.7               | 50.0          | 112.0           | 78.2              | 84.5                | 56.6                |
| 22-Jul      | 98.0           | 67.7                | 85.0               | 59.7               | 53.0          | 107.8           | 74.9              | 84.8                | 57.3                |
| 29-Jul      | 99.0           | 69.0                | 86.1               | 60.0               | 53.0          | 108.5           | 77.3              | 83.4                | 56.1                |
| 5-Aug       | 96.0           | 66.3                | 84.8               | 58.8               | 51.0          | 107.8           | 77.4              | 81.7                | 55.2                |
| 12-Aug      | 98.0           | 65.1                | 85.8               | 58.3               | 51.0          | 108.5           | 79.8              | 79.9                | 53.0                |
| 19-Aug      | 97.0           | 65.5                | 84.6               | 58.2               | 50.0          | 108.5           | 75.5              | 81.1                | 54.1                |
| 26-Aug      | 98.0           | 64.5                | 84.7               | 57.7               | 48.0          | 107.8           | 76.8              | 77.8                | 51.1                |
| 2-Sep       | 96.0           | 62.9                | 82.8               | 54.7               | 44.0          | 100.1           | 75.1              | 68.6                | 45.0                |
| 9-Sep       | 97.0           | 63.8                | 80.8               | 52.5               | 42.0          | 93.1            | 74.6              | 62.3                | 40.6                |
| 16-Sep      | 91.0           | 60.4                | 74.3               | 48.0               | 36.0          | 89.6            | 67.7              | 56.4                | 36.8                |
| 23-Sep      | 87.0           | 57.6                | 69.8               | 43.6               | 31.0          | 74.9            | 67.1              | 47.9                | 31.0                |
| 30-Sep      | 89.0           | 58.1                | 71.1               | 43.6               | 29.0          | 71.4            | 61.0              | 44.5                | 29.1                |
| 7-Oct       | 86.0           | 56.7                | 65.6               | 39.9               | 29.0          | 70.0            | 58.7              | 40.0                | 26.1                |
| 14-Oct      | 81.0           | 55.0                | 63.1               | 37.8               | 25.0          | 58.8            | 59.4              | 37.4                | 24.6                |
| 21-Oct      | 79.0           | 54.0                | 61.1               | 35.5               | 22.0          | 57.4            | 53.2              | 36.5                | 24.7                |
| 28-Oct      | 77.0           | 53.4                | 59.6               | 33.5               | 17.0          | 55.3            | 50.8              | 33.0                | 21.2                |
| 4-Nov       | 72.0           | 50.5                | 52.9               | 30.0               | 4.0           | 49.7            | 53.0              | 29.6                | 18.9                |
| 11-Nov      | 68.0           | 50.9                | 47.4               | 26.0               | 4.0           | 39.2            | 49.9              | 27.6                | 16.7                |
| 18-Nov      | 67.0           | 46.9                | 47.2               | 25.2               | 5.0           | 40.6            | 54.2              | 26.4                | 15.5                |
| 25-Nov      | 62.0           | 44.8                | 40.0               | 19.6               | -4.0          | 34.3            | 46.8              | 22.2                | 12.7                |
| 2-Dec       | 59.0           | 43.0                | 37.2               | 17.1               | -9.0          | 32.9            | 42.6              | 21.2                | 11.2                |
| 9-Dec       | 60.0           | 44.0                | 40.2               | 18.2               | -6.0          | 32.2            | 46.4              | 21.7                | 11.7                |
| 16-Dec      | 58.0           | 44.8                | 36.8               | 16.6               | -7.0          | 33.6            | 43.0              | 21.0                | 11.1                |
| 23-Dec      | 53.0           | 41.2                | 32.9               | 12.6               | -21.0         | 30.1            | 41.2              | 19.2                | 9.6                 |
| 31-Dec      | 51.0           | 39.5                | 32.1               | 12.3               | -18.0         | 33.6            | 45.5              | 18.3                | 9.8                 |



|     | Mean Cooling<br>Degree Days (°F) | Mean Heating<br>Degree Days (°F) |
|-----|----------------------------------|----------------------------------|
| JAN | 0                                | 1302                             |
| FEB | 1                                | 1078                             |
| MAR | 3                                | 926                              |
| APR | 20                               | 599                              |
| MAY | 51                               | 333                              |
| JUN | 145                              | 127                              |
| JUL | 275                              | 47                               |
| AUG | 245                              | 64                               |
| SEP | 108                              | 241                              |
| OCT | 25                               | 524                              |
| NOV | 2                                | 960                              |
| DEC | 0                                | 1241                             |
| ANN | 874                              | 7442                             |

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



|     | Average Sensible<br>Cooling Load | Average Sensible<br>Heating Load | Average Latent<br>Cooling Load | Average Latent<br>Heating Load |
|-----|----------------------------------|----------------------------------|--------------------------------|--------------------------------|
|     | (Btu/cfm)                        | (Btu/cfm)                        | (Btu/cfm)                      | (Btu/cfm)                      |
| JAN | 0                                | -36153                           | 0                              | -10186                         |
| FEB | 0                                | -30123                           | 0                              | -8484                          |
| MAR | 4                                | -26366                           | 0                              | -6855                          |
| APR | 98                               | -17680                           | 0                              | -3753                          |
| MAY | 258                              | -10583                           | 16                             | -881                           |
| JUN | 1147                             | -4603                            | 381                            | -64                            |
| JUL | 2745                             | -2029                            | 617                            | -21                            |
| AUG | 2374                             | -2595                            | 441                            | -78                            |
| SEP | 910                              | -7858                            | 15                             | -981                           |
| OCT | 126                              | -15681                           | 0                              | -3367                          |
| NOV | 0                                | -27200                           | 0                              | -7238                          |
| DEC | 0                                | -34565                           | 0                              | -9660                          |
| ANN | 7662                             | -215436                          | 1470                           | -51568                         |

## Average Annual Solar Radiation – Nearest Available Site

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

City: RAPID CITY  
 State: SD  
 WBAN No: 24090  
 Lat(N): 44.05  
 Long(W): 103.07  
 Elev(ft): 3169

Stn Type: Secondary  
 SHADING GEOMETRY IN DIMENSIONLESS UNITS  
 Window: 1  
 Overhang: 0.65  
 Vert Gap: 0.331

| AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day), Percentage Uncertainty = 9 |         | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Year |
|-------------------------------------------------------------------------------|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| HORIZ                                                                         | Global  | 590  | 870  | 1250 | 1610 | 1890 | 2130 | 2150 | 1920 | 1490 | 1040 | 660  | 510  | 1350 |
|                                                                               | Std Dev | 39   | 39   | 84   | 129  | 121  | 135  | 72   | 76   | 118  | 67   | 34   | 29   | 30   |
|                                                                               | Minimum | 510  | 770  | 1090 | 1440 | 1620 | 1890 | 2010 | 1790 | 1170 | 900  | 580  | 470  | 1290 |
|                                                                               | Maximum | 660  | 950  | 1410 | 1880 | 2080 | 2370 | 2260 | 2100 | 1700 | 1160 | 720  | 570  | 1420 |
|                                                                               | Diffuse | 270  | 380  | 540  | 660  | 730  | 720  | 650  | 560  | 450  | 350  | 280  | 230  | 490  |
| Clear Day                                                                     | Global  | 770  | 1130 | 1670 | 2220 | 2580 | 2720 | 2630 | 2300 | 1810 | 1260 | 830  | 660  | 1720 |
| NORTH                                                                         | Global  | 170  | 250  | 340  | 440  | 560  | 640  | 600  | 470  | 350  | 260  | 190  | 150  | 370  |
|                                                                               | Diffuse | 170  | 250  | 340  | 430  | 490  | 520  | 490  | 430  | 340  | 260  | 190  | 150  | 340  |
| Clear Day                                                                     | Global  | 150  | 210  | 300  | 410  | 590  | 720  | 640  | 470  | 320  | 230  | 160  | 140  | 360  |
| EAST                                                                          | Global  | 430  | 600  | 820  | 1020 | 1150 | 1270 | 1290 | 1200 | 970  | 730  | 470  | 390  | 860  |
|                                                                               | Diffuse | 220  | 310  | 430  | 520  | 580  | 610  | 590  | 530  | 430  | 320  | 240  | 190  | 410  |
| Clear Day                                                                     | Global  | 640  | 880  | 1180 | 1440 | 1570 | 1610 | 1560 | 1450 | 1230 | 940  | 680  | 570  | 1150 |
| SOUTH                                                                         | Global  | 1150 | 1270 | 1260 | 1110 | 950  | 910  | 980  | 1160 | 1330 | 1390 | 1180 | 1100 | 1150 |
|                                                                               | Diffuse | 340  | 430  | 520  | 550  | 560  | 560  | 550  | 530  | 470  | 410  | 350  | 310  | 460  |
| Clear Day                                                                     | Global  | 1930 | 2050 | 1960 | 1580 | 1230 | 1070 | 1120 | 1400 | 1760 | 1980 | 1920 | 1850 | 1650 |
| WEST                                                                          | Global  | 440  | 610  | 820  | 970  | 1080 | 1170 | 1210 | 1150 | 960  | 720  | 480  | 390  | 830  |
|                                                                               | Diffuse | 220  | 310  | 440  | 530  | 590  | 610  | 600  | 540  | 430  | 330  | 240  | 200  | 420  |
| Clear Day                                                                     | Global  | 640  | 880  | 1180 | 1440 | 1570 | 1610 | 1560 | 1450 | 1230 | 940  | 680  | 570  | 1150 |

## Average Annual Solar Heat and Illumination – Nearest Available Site

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

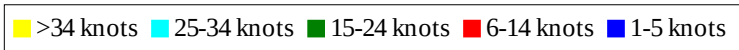
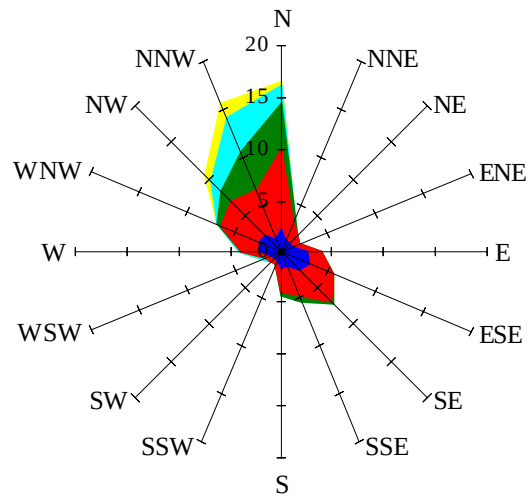
| AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING, Percentage Uncertainty = 9 |          | Jan | Feb | Mar | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov | Dec | Year |
|-----------------------------------------------------------------------------------------------------|----------|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|------|
| HORIZ                                                                                               | Unshaded | 360 | 580 | 870 | 1150 | 1360 | 1550 | 1570 | 1390 | 1060 | 700  | 420 | 310 | 950  |
| NORTH                                                                                               | Unshaded | 120 | 170 | 240 | 300  | 360  | 410  | 390  | 310  | 240  | 180  | 130 | 110 | 250  |
|                                                                                                     | Shaded   | 100 | 150 | 210 | 260  | 320  | 360  | 340  | 280  | 210  | 160  | 110 | 91  | 220  |
| EAST                                                                                                | Unshaded | 290 | 420 | 580 | 730  | 820  | 910  | 920  | 860  | 690  | 510  | 330 | 260 | 610  |
|                                                                                                     | Shaded   | 260 | 360 | 490 | 600  | 670  | 740  | 750  | 710  | 580  | 440  | 290 | 230 | 510  |
| SOUTH                                                                                               | Unshaded | 870 | 940 | 890 | 740  | 600  | 550  | 590  | 740  | 910  | 1010 | 890 | 840 | 800  |
|                                                                                                     | Shaded   | 850 | 870 | 680 | 430  | 340  | 340  | 340  | 380  | 600  | 880  | 860 | 820 | 610  |
| WEST                                                                                                | Unshaded | 300 | 430 | 580 | 690  | 770  | 840  | 860  | 830  | 690  | 510  | 330 | 270 | 590  |
|                                                                                                     | Shaded   | 270 | 370 | 490 | 570  | 630  | 680  | 700  | 680  | 580  | 440  | 290 | 240 | 500  |

| 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  | 41    | 69   | 75  | 57  | 22  | 54   | 85   | 99  | 92  | 66  |
|                                                                                                                  | M.Cloudy | 27    | 48   | 54  | 41  | 15  | 35   | 61   | 73  | 65  | 46  |
| NORTH                                                                                                            | M.Clear  | 10    | 13   | 14  | 12  | 7   | 13   | 15   | 16  | 16  | 13  |
|                                                                                                                  | M.Cloudy | 10    | 15   | 16  | 13  | 6   | 13   | 17   | 18  | 17  | 14  |
| EAST                                                                                                             | M.Clear  | 76    | 52   | 14  | 12  | 7   | 85   | 69   | 26  | 16  | 13  |
|                                                                                                                  | M.Cloudy | 35    | 33   | 16  | 13  | 6   | 44   | 47   | 24  | 17  | 14  |
| SOUTH                                                                                                            | M.Clear  | 47    | 80   | 88  | 67  | 25  | 12   | 39   | 53  | 47  | 22  |
|                                                                                                                  | M.Cloudy | 24    | 45   | 52  | 39  | 12  | 12   | 31   | 42  | 35  | 19  |
| WEST                                                                                                             | M.Clear  | 10    | 13   | 26  | 68  | 65  | 12   | 15   | 16  | 55  | 81  |
|                                                                                                                  | M.Cloudy | 10    | 15   | 23  | 40  | 25  | 12   | 17   | 18  | 40  | 49  |
| M.Clear                                                                                                          | (% hrs)  | 32    | 31   | 28  | 28  | 29  | 51   | 49   | 45  | 38  | 35  |
|                                                                                                                  |          | Sept  |      |     |     |     | Dec  |      |     |     |     |
|                                                                                                                  |          | 9am   | 11am | 1pm | 3pm | 5pm | 9am  | 11am | 1pm | 3pm | 5pm |
| HORIZ.                                                                                                           | M.Clear  | 32    | 66   | 81  | 72  | 43  | 13   | 36   | 39  | 21  | 0   |
|                                                                                                                  | M.Cloudy | 18    | 45   | 55  | 48  | 28  | 9    | 24   | 27  | 14  | 0   |
| NORTH                                                                                                            | M.Clear  | 8     | 13   | 14  | 13  | 10  | 5    | 9    | 9   | 7   | 0   |
|                                                                                                                  | M.Cloudy | 7     | 14   | 16  | 15  | 10  | 4    | 9    | 10  | 6   | 0   |
| EAST                                                                                                             | M.Clear  | 76    | 67   | 22  | 13  | 10  | 39   | 35   | 9   | 7   | 0   |
|                                                                                                                  | M.Cloudy | 27    | 40   | 20  | 15  | 10  | 14   | 18   | 10  | 6   | 0   |
| SOUTH                                                                                                            | M.Clear  | 28    | 64   | 81  | 71  | 39  | 39   | 84   | 89  | 57  | 0   |
|                                                                                                                  | M.Cloudy | 13    | 38   | 49  | 42  | 22  | 14   | 36   | 41  | 23  | 0   |
| WEST                                                                                                             | M.Clear  | 8     | 13   | 14  | 56  | 77  | 5    | 9    | 24  | 45  | 0   |
|                                                                                                                  | M.Cloudy | 7     | 14   | 16  | 35  | 38  | 4    | 9    | 16  | 19  | 0   |
| M.Clear                                                                                                          | (% hrs)  | 54    | 53   | 55  | 52  | 51  | 34   | 36   | 35  | 37  | 38  |



### Wind Summary - December, January, and February

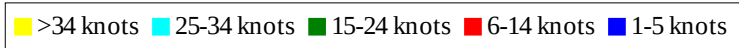
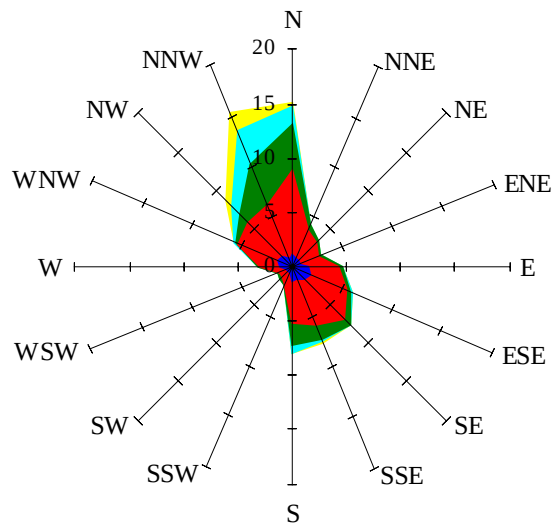
Labels of Percent Frequency on North Axis



Percent Calm = 8.07

### Wind Summary - March, April, and May

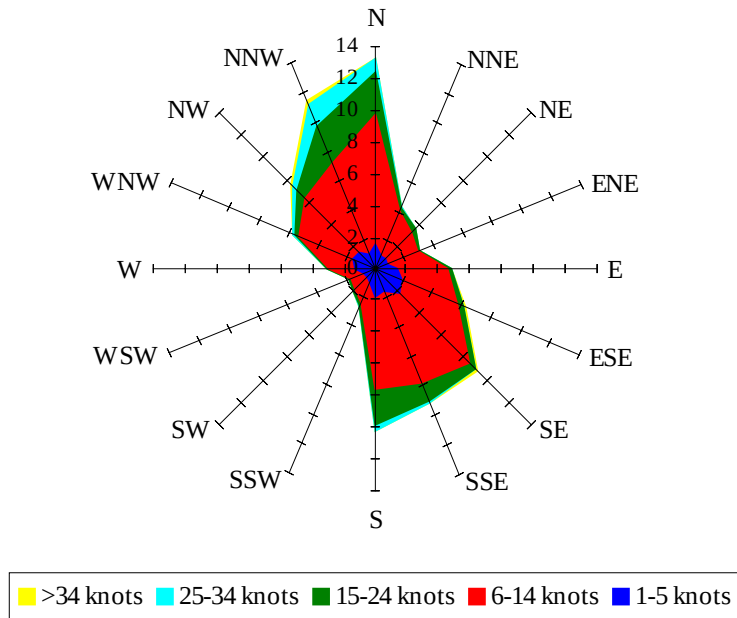
Labels of Percent Frequency on North Axis



Percent Calm = 3.58

### Wind Summary - June, July, and August

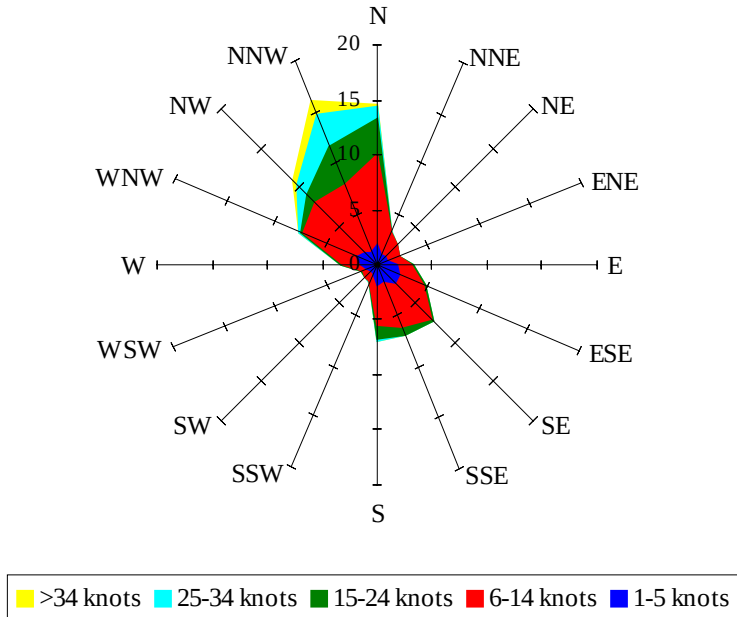
Labels of Percent Frequency on North Axis



Percent Calm = 2.98

### Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 5.80