

UFC 3-310-01
30 June 2000



UNIFIED FACILITIES CRITERIA (UFC)

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U.S. ARMY CORPS OF ENGINEERS (Preparing Activity)

NAVAL FACILITIES ENGINEERING COMMAND

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UNIFIED FACILITIES CRITERIA (UFC)

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Record of Changes (changes indicated by \1\ ... /1/)

Change No. Date Location

This UFC supersedes TI 809-01, dated 3 August 1998; AFM 88-3, Chapter 1, dated 20 May 1992; and MIL-HDBK-1002/2A, dated 15 October 1996. The format of this document does not conform to UFC 1-300-1; however, it will be reformatted at the next revision.

FOREWORD

The Unified Facilities Criteria (UFC) system provides planning, design, construction, operations and maintenance criteria, and applies to all service commands having military construction responsibilities. UFC will be used for all service projects and work for other customers where appropriate.

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- Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street (ATTN: NAVFAC Criteria Office), Norfolk, Virginia 23511-2699 or crit_innov_07@efdlant.navy.mil, by commercial telephone (757)322-4200 or DSN 262-4200, or by facsimile machine to (757) 322-4416
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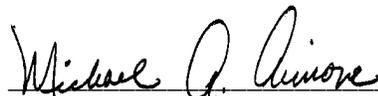
AUTHORIZED BY:



Dwight A. Beranek, P.E.
Chief, Engineering and Construction Division
U.S. Army Corps of Engineers



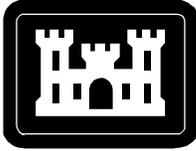
Dr. Ger Moy, P.E.
Chief Engineer and
Director of Planning and Engineering,
Naval Facilities Engineering Command



Michael A. Aimone, P.E.
Deputy Civil Engineer
Deputy Chief of Staff, Installations & Logistics
Department of the Air Force



Frank Lane
Director of Analysis & Investment
Deputy Under Secretary of Defense
for Installations
Department of Defense



**US Army Corps
of Engineers®**

**TI 809-01
3 August 1998**

Technical Instructions

LOAD ASSUMPTIONS FOR BUILDINGS

**Headquarters
U.S. Army Corps of Engineers
Engineering Division
Directorate of Military Programs
Washington, DC 20314-1000**

TECHNICAL INSTRUCTIONS

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Record of Changes (changes indicated by \1\ ... /1/)

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This Technical Instruction supersedes EI 01S010, dated 1 August 1996.

INTRODUCTION

1. PURPOSE AND SCOPE. This document provides snow and wind loads plus frost penetration data to be used in the design and construction of buildings and other structures for the Army. The snow and wind loadings specified herein are minimums; the designer should determine if special loadings must be considered.

2. APPLICABILITY. These instructions are applicable to all elements responsible for the design of military construction.

3. REFERENCES.

Government Publications:

TM 5-852-6 Arctic and Subarctic Construction--Calculation Methods for Determination of Depth Of Freeze and Thaw in Soils.

"Building Foundation Design Handbook," K. Labs, J. Carmody, R. Sterling, L. Shen, Y. Huang, D. Parker, Oak Ridge National Lab Report ORNL/Sub/86-72143/1 (May 1988).

[\1\ TI 809-04](#) [Seismic Design for Buildings/1/](#)

Nongovernment Publication:

ASCE 7-95 Minimum Design Loads for Buildings and Other Structures.

4. BASIS FOR DESIGN. Except as indicated, all design snow and wind loads criteria are based on the requirements in ASCE 7. [\1\ Seismic loads criteria are based on TI 809-04./1/](#) Buildings are categorized according to occupancy. The categories described in ASCE 7 (with the following modifications) will be used to determine snow and wind loads:

a. Add to the list of Category III buildings: Buildings housing expensive items, i.e., aircraft, computer equipment, etc.

b. Add to the list of Category IV buildings:

(1) Facilities involving missile operations.

(2) Facilities involving sensitive munitions, fuels, and chemical and biological contaminants.

(3) Facilities involving strategic communications.

5. SNOW DATA. Site-specific snow data for major cities and installations in the United States and outside the United States are tabulated in tables 1 and 2, respectively; the values in table 1 are based on a 50-year mean recurrence interval. The data in table 1 will be used in lieu of the mapped information in ASCE 7; the mapped information will be used for locations not tabulated in table 1. The values in table 2 (where available) were provided by the Department of Navy; the designer should verify the data with local authorities before using them. The recommendations for establishing the magnitude of rain-on-snow surcharge loads contained in ASCE 7 will be considered in structural design.

6. FROST PENETRATION. The values shown in tables 1 and 2 will be used to establish minimum design depth of building foundations below finished grade. The depth to which frost penetrates at a site depends on the climate, the type of soil, the moisture in the soil and the surface cover (e.g., pavement kept clear of snow vs. snow covered turf). If the supporting soil is warmed by heat from a building, frost penetration is reduced considerably. The values in tables 1 and 2 represent the depth of frost penetration to be expected if the ground is bare of vegetation and snow cover, the soil is non-frost susceptible (NFS), well-drained (i.e., dry) sand or gravel, and no building heat is available. Thus, these values represent the deepest (i.e., worst case) frost penetration expected in each area. Most building foundations can be at a shallower depth without suffering frost action. (However, other considerations besides frost penetration may affect foundation depth, such as erosion potential or moisture desiccation). For interior footings, which under service conditions are not normally susceptible to frost, the potential effects of frost heave during construction should be considered. Design values for heated and unheated buildings may be obtained by reducing the values in tables 1 and 2 according to figure 1. For buildings heated only infrequently, the curve in figure 1 for unheated buildings should be used. The curves in figure 1 were established with an appreciation for the variability of soil and the understanding that some portions of the building may abut snow-covered turf while other portions abut paved areas kept clear of snow. Foundations should be placed at or below the depths calculated above. The foundation may be placed at a shallower depth than calculated above if protected from frost action by insulation on the cold side. For more information on foundation insulation, see "Building Foundation Design Handbook" by Oak Ridge National Laboratory. Additional information on which more refined estimates of frost penetration can be made, based on site-specific climatic information, the type of ground cover and soil conditions is contained in TM 5-852-6.

7. CALCULATION OF FROST PENETRATION. In this example the minimum depth needed for footings of a hospital and an unheated vehicle storage building to be built in Bangor, Maine, is calculated to protect them from frost action. The tabulated frost penetration value for Bangor, Maine, is 98 inches (table 1). Using the "heated" curve in figure 1, footings for the hospital should be located 4 feet below the surface. Using the "unheated" curve, footings for the unheated garage should be located 6 feet below the surface.

8. WIND DATA. Site-specific wind data for major cities and installations in the United States and outside the United States are tabulated in tables 1 and 2, respectively; the values in table 1 are based on a 50-year mean recurrence interval, 3-second gust speeds, 33 ft. above the ground for exposure C. Note that the data in table 1 will be used in lieu of the wind data tabulated in ASCE 7. For locations not tabulated in table 1 the basic wind speed in ASCE 7 may be used. The values shown in table 2, except for Oman, were provided by the Department of Navy and are based on 2.5 seconds duration. The values for Oman are from Army sources and are based on 3.0 seconds duration. The designer should verify the data in table 2 with local authorities before using them.

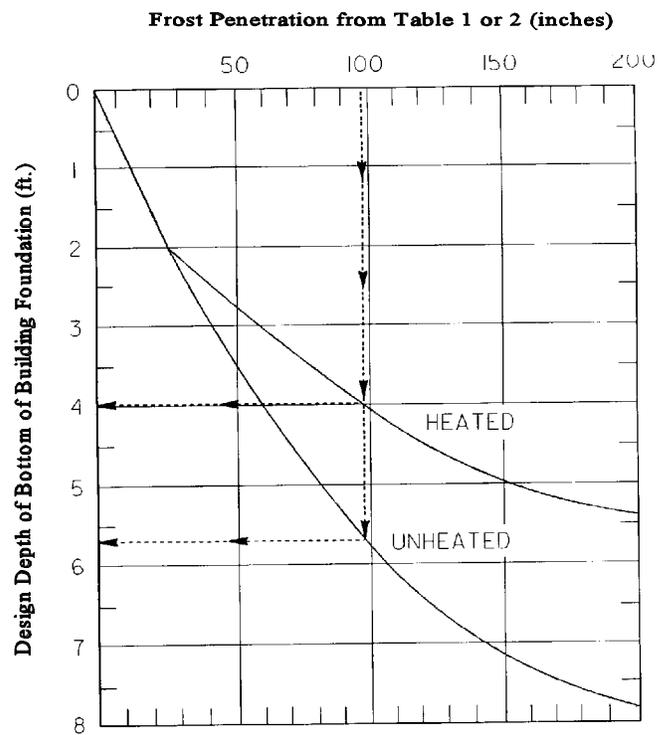


Figure 1. Design Depth of Bottom of Building Foundation

Table 1. Snow, Frost, and Wind Data Inside the United States

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|------------------|------------------------------|----------------------------------|------------------------------|
| ALABAMA | | | |
| Anniston | 5 | 6 | 90 |
| Maxwell AFB | 5 | 4 | 90 |
| Birmingham | 5 | 6 | 90 |
| Huntsville | 10 | 9 | 90 |
| Mobile | 0 | 0 | 130 |
| Montgomery | 5 | 4 | 90 |
| Fort Rucker | 0 | 0 | 100 |
| ALASKA | | | |
| Adak Island | 30 | 52 | 130 |
| Anchorage | 45 | 129 | 100 |
| Annette | 35 | 22 | - |
| Attu | 60 | 26 | 130 |
| Barrow | 25 | Permafrost | 120 |
| Bethel | 40 | Permafrost | 125 |
| Cold Bay | 25 | 64 | 130 |
| Cordova | 100 | 86 | 130 |
| Eielson AFB | 70 | Permafrost | 90 |
| Elmendorf AFB | 40 | 129 | 100 |
| Fairbanks | 60 | Permafrost | 90 |
| Fort Greely | 50 | Permafrost | 90 |
| Fort Richardson | 40 | 129 | 100 |
| Fort Wainwright | 60 | Permafrost | 90 |
| Gambell | 60 | Permafrost | - |
| Juneau | 60 | 86 | 100 |
| King Salmon | 15 | 152 | 130 |
| Kodiak | 30 | 86 | 130 |
| Kotzebue | 60 | Permafrost | 120 |
| McGrath | 70 | Permafrost | 100 |
| Middleton Island | 30 | 22 | 130 |
| Nikolski | 30 | 54 | 130 |
| Nome | 60 | Permafrost | 130 |
| Northeast Cape | 70 | Permafrost | - |
| Palmer | 45 | 143 | 100 |
| Petersburg | 130 | 64 | 100 |
| St. Paul Island | 35 | 86 | - |
| Seward | 50 | 107 | 130 |
| Shemya | 25 | 52 | - |
| Sitka | 50 | 56 | 120 |
| Talkeetna | 120 | 190 | 90 |
| Umiat | 25 | Permafrost | 110 |
| Unalakleet | 40 | Permafrost | 130 |
| Valdez | 170 | 136 | 100 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-------------------|------------------------------|----------------------------------|------------------------------|
| Wales | 50 | Permafrost | 130 |
| Whittier | 300 | 18 | 110 |
| Wrangell | 60 | 64 | 110 |
| Yakutat | 150 | 77 | 120 |
| ARIZONA | | | |
| Fort Huachuca | 5 | 0 | 90 |
| Luke AFB | 0 | 0 | 90 |
| Navajo AD | 90 | 51 | 90 |
| Phoenix | 0 | 0 | 90 |
| Tucson | 5 | 0 | 90 |
| Williams AFB | 0 | 0 | 90 |
| Yuma | 0 | 0 | 90 |
| ARKANSAS | | | |
| Eaker AFB | 10 | 18 | 90 |
| Fort Chaffee | 10 | 20 | 90 |
| Little Rock AFB | 10 | 14 | 90 |
| Pine Bluff | 10 | 9 | 90 |
| CALIFORNIA | | | |
| 29 Palms | 5 | 5 | 85 |
| Barstow | 5 | 18 | 85 |
| Camp Pendelton | 0 | 4 | 85 |
| Castle AFB | 0 | 9 | 85 |
| China Lake | 5 | 22 | - |
| Edwards AFB | 5 | 22 | - |
| Fort Ord | 0 | 0 | 85 |
| Hamilton AFB | 0 | 0 | - |
| Hunter-Liggett MR | 0 | 0 | - |
| Los Angeles | 0 | 0 | 85 |
| March AFB | 0 | 14 | - |
| Mare Island | 0 | 0 | - |
| Norton AFB | 0 | 18 | - |
| Oakland | 0 | 0 | 85 |
| Port Hueneme | 0 | 0 | 85 |
| Sacramento | 0 | 5 | 85 |
| San Diego | 0 | 0 | 85 |
| San Francisco | 0 | 4 | 85 |
| Sharpe AD | 0 | 4 | 85 |
| Sierra AD | 15 | 54 | - |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|--------------------|------------------------------|----------------------------------|------------------------------|
| Stockton | 0 | 4 | 85 |
| Travis AFB | 0 | 0 | 85 |
| Vandenberg AFB | 0 | 0 | 85 |
| COLORADO | | | |
| USAF Academy | 30 | 38 | - |
| Fort Carson | 15 | 38 | - |
| Denver | 20 | 52 | - |
| Fitzsimons AMC | 20 | 52 | - |
| Peterson AFB | 15 | 38 | - |
| Pueblo | 10 | 38 | - |
| CONNECTICUT | | | |
| Hartford | 30 | 52 | 110 |
| New Haven | 25 | 38 | 120 |
| New London | 30 | 38 | 120 |
| DELAWARE | | | |
| Dover AFB | 25 | 22 | 105 |
| Wilmington | 20 | 22 | 100 |
| Lewes | 20 | 22 | 110 |
| FLORIDA | | | |
| Eglin AFB | 0 | 0 | 140 |
| Homestead AS | 0 | 0 | 150 |
| Jacksonville | 0 | 0 | 120 |
| Key West | 0 | 0 | 150 |
| MacDill AFB | 0 | 0 | 130 |
| Miami | 0 | 0 | 150 |
| Orlando | 0 | 0 | 130 |
| Patrick AFB | 0 | 0 | 135 |
| Pensacola | 0 | 0 | 140 |
| Tampa | 0 | 0 | 130 |
| Tyndall AFB | 0 | 0 | 130 |
| GEORGIA | | | |
| Albany | 0 | 0 | 90 |
| Atlanta | 5 | 5 | 90 |
| Augusta | 5 | 0 | 90 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|---------------------|------------------------------|----------------------------------|------------------------------|
| Fort Benning | 5 | 0 | 90 |
| Fort Gordon | 5 | 0 | 90 |
| Fort Stewart | 0 | 0 | 120 |
| Hunter AFB | 0 | 0 | - |
| Kings Bay | 0 | 0 | 120 |
| Macon | 5 | 0 | 90 |
| Robins AFB | 5 | 0 | 90 |
| Savannah | 0 | 0 | 120 |
| HAWAII | | | |
| Barbers Point, Oahu | 0 | 0 | 105 |
| Hickam AFB | 0 | 0 | 105 |
| Hilo, Hawaii | 0 | 0 | 105 |
| Honolulu, Oahu | 0 | 0 | 105 |
| Kaneohe Bay, Oahu | 0 | 0 | 105 |
| Lihue, Kauai | 0 | 0 | 105 |
| Schofield Barracks | 0 | 0 | 105 |
| Wheeler AFB | 0 | 0 | 105 |
| IDAHO | | | |
| Idaho Falls | 30 | 86 | 90 |
| Mountain Home AFB | 15 | 64 | 90 |
| ILLINOIS | | | |
| Chanute AFB | 20 | 52 | 90 |
| Chicago | 25 | 59 | 90 |
| Great Lakes TC | 30 | 64 | 90 |
| Joliet AAP | 25 | 59 | 90 |
| O'Hare IAP | 25 | 61 | 90 |
| Rock Island Arsenal | 20 | 64 | 90 |
| Savanna AD | 25 | 75 | 90 |
| Scott AFB | 20 | 38 | 90 |
| INDIANA | | | |
| Fort Ben Harrison | 20 | 44 | 90 |
| Fort Wayne | 20 | 64 | 90 |
| Grissom AFB | 20 | 49 | 90 |
| Indiana AAP | 20 | 36 | 90 |
| Indianapolis | 20 | 44 | 90 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-------------------------|------------------------------|----------------------------------|------------------------------|
| IOWA | | | |
| Burlington | 20 | 64 | 90 |
| Cedar Rapids | 25 | 79 | 90 |
| Des Moines | 20 | 82 | 90 |
| Sioux City | 30 | 74 | 90 |
| KANSAS | | | |
| Forbes AFB, Topeka | 20 | 49 | 90 |
| Kansas AAP | 15 | 32 | 90 |
| Fort Leavenworth | 20 | 54 | 90 |
| McConnell AFB | 15 | 38 | 90 |
| Fort Riley | 20 | 52 | 90 |
| Schilling AFB, Salina | 20 | 46 | 90 |
| Sunflower AAP | 20 | 49 | 90 |
| KENTUCKY | | | |
| Fort Campbell | 15 | 22 | 90 |
| Fort Knox | 15 | 32 | 90 |
| Lexington | 15 | 32 | 90 |
| Louisville | 15 | 32 | 90 |
| LOUISIANA | | | |
| Barksdale AFB | 5 | 7 | 90 |
| Fort Polk | 5 | 0 | 100 |
| Lake Charles | 0 | 0 | 115 |
| Louisiana AAP | 5 | 7 | 90 |
| New Orleans | 0 | 0 | 130 |
| Shreveport | 5 | 7 | 90 |
| MAINE | | | |
| Bangor | 70 | 98 | 90 |
| Brunswick | 60 | 86 | 100 |
| Loring AFB | 100 | 133 | 90 |
| Portland | 60 | 86 | 100 |
| Winter Harbor | 50 | 86 | 100 |
| MARYLAND | | | |
| Aberdeen Proving Ground | 25 | 29 | 100 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------|------------------------------|----------------------------------|------------------------------|
| Andrews AFB | 25 | 26 | 90 |
| Annapolis | 25 | 26 | 90 |
| Baltimore | 25 | 29 | 90 |
| Fort Detrick | 30 | 29 | 90 |
| Fort Meade | 25 | 26 | 90 |
| Fort Ritchie | 45 | 32 | 90 |
| Lexington Park | 20 | 22 | 100 |
| MASSACHUSETTS | | | |
| Boston | 35 | 49 | 110 |
| Fort Devens | 50 | 64 | 105 |
| L.G. Hanscom Field | 45 | 54 | 110 |
| Otis AFB | 35 | 38 | 125 |
| Springfield | 35 | 64 | 105 |
| Westover AFB | 35 | 64 | 105 |
| MICHIGAN | | | |
| Detroit | 20 | 61 | 90 |
| Kincheloe AFB | 70 | 102 | 90 |
| K.I. Sawyer AFB | 70 | 102 | 90 |
| Selfridge AFB | 20 | 59 | 90 |
| Wurtsmith AFB | 40 | 84 | 90 |
| MINNESOTA | | | |
| Duluth | 60 | 140 | 90 |
| Minneapolis | 50 | 125 | 90 |
| MISSISSIPPI | | | |
| Biloxi | 0 | 0 | 130 |
| Columbus AFB | 10 | 7 | 90 |
| Jackson | 5 | 5 | 90 |
| Keesler AFB | 0 | 0 | 130 |
| Gulfport | 0 | 0 | 130 |
| Meridian | 5 | 5 | 90 |
| Mississippi AAP | 5 | 0 | 130 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------|------------------------------|----------------------------------|------------------------------|
| MISSOURI | | | |
| Fort Leonard Wood | 20 | 36 | 90 |
| Kansas City | 20 | 49 | 90 |
| Lake City AAP | 20 | 49 | 90 |
| Richards Gebaur AFB | 20 | 49 | 90 |
| St. Louis | 20 | 38 | 90 |
| Whiteman AFB | 20 | 46 | 90 |
| MONTANA | | | |
| Helena | 20 | 107 | 90 |
| Malmstrom AFB | 20 | 107 | 90 |
| Missoula | 20 | 77 | 90 |
| NEBRASKA | | | |
| Cornhusker AAP | 25 | 64 | 90 |
| Hastings | 25 | 64 | 90 |
| Lincoln | 25 | 64 | 90 |
| Offutt AFB | 25 | 73 | 90 |
| Omaha | 25 | 75 | 90 |
| NEVADA | | | |
| Carson City | 20 | 23 | 90 |
| Fallon | 10 | 23 | 90 |
| Hawthorne | 10 | 23 | 90 |
| Las Vegas | 5 | 0 | 90 |
| Reno | 15 | 31 | 90 |
| Stead AFB | 15 | 34 | - |
| NEW HAMPSHIRE | | | |
| Hanover | 60 | 98 | - |
| Pease AFB | 50 | 64 | 105 |
| Portsmouth | 50 | 64 | 105 |
| NEW JERSEY | | | |
| Atlantic City | 20 | 18 | 120 |
| Bayonne | 20 | 38 | 110 |
| Cape May | 25 | 18 | 115 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|------------------------|------------------------|----------------------------|------------------------|
| Fort Monmouth | 25 | 38 | 110 |
| McGuire AFB | 25 | 29 | 110 |
| Picatinny Arsenal | 35 | 32 | 105 |
| NEW MEXICO | | | |
| Albuquerque | 5 | 18 | 90 |
| Cannon AFB | 15 | 18 | 90 |
| Holloman AFB | 5 | 4 | 90 |
| Kirtland AFB | 5 | 18 | (a) |
| Sacramento PK | 50 | 18 | - |
| White Sands MR | 5 | 4 | 90 |
| NEW YORK | | | |
| Albany | 40 | 82 | 90 |
| Buffalo | 45 | 59 | 90 |
| Fort Drum | 70 | 94 | 90 |
| Griffis AFB | 60 | 86 | - |
| New York City | 20 | 38 | 115 |
| Niagara Falls IAP | 35 | 59 | 90 |
| Plattsburg AFB | 50 | 107 | 90 |
| Stewart AFB, Newburgh | 35 | 54 | 90 |
| Syracuse | 40 | 73 | 90 |
| Watervliet | 35 | 86 | 90 |
| West Point Mil Res | 35 | 54 | 90 |
| NORTH CAROLINA | | | |
| Fort Bragg | 10 | 0 | 100 |
| Charlotte | 10 | 4 | 90 |
| Cherry Point | 10 | 0 | 140 |
| Camp Lejeune | 10 | 0 | 125 |
| Cape Hatteras | 5 | 0 | 140 |
| Greensboro | 15 | 8 | 90 |
| Pope AFB | 10 | 0 | 100 |
| Seymour Johnson | 10 | 4 | 130 |
| Sunny Point Ocean Term | 10 | 0 | 130 |
| Wilmington | 10 | 0 | 125 |
| NORTH DAKOTA | | | |
| Bismarck | 35 | 150 | 90 |
| Fargo | 40 | 153 | 90 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------|------------------------------|----------------------------------|------------------------------|
| Grand Forks AFB | 50 | 166 | 90 |
| Minot AFB | 35 | 163 | 90 |
| OHIO | | | |
| Cincinnati | 20 | 38 | 90 |
| Cleveland | 20 | 52 | 90 |
| Columbus | 20 | 46 | 90 |
| Ravenna AAP | 20 | 54 | 90 |
| Wright-Patterson AFB | 20 | 49 | 90 |
| OKLAHOMA | | | |
| Altus AFB | 10 | 14 | 90 |
| Enid/Vance AFB | 10 | 22 | 90 |
| Fort Sill | 10 | 14 | 90 |
| McAlester | 10 | 16 | 90 |
| Tinker AFB | 10 | 17 | 90 |
| Tulsa | 10 | 22 | 90 |
| OREGON | | | |
| Coos Bay | 5 | 0 | - |
| Eugene | 15 | 9 | 85 |
| Portland | 10 | 14 | - |
| Umatilla AD | 15 | 54 | 85 |
| PENNSYLVANIA | | | |
| Carlisle Barracks | 25 | 36 | 90 |
| Fort Indiantown Gap | 30 | 49 | 90 |
| Harrisburg | 25 | 36 | 90 |
| Letterkenny AD | 30 | 36 | 90 |
| Olmstead AFB | 25 | 38 | 90 |
| Philadelphia | 20 | 30 | 105 |
| Pittsburgh | 25 | 38 | 90 |
| Scranton | 25 | 54 | 90 |
| Tobyhanna AD | 50 | 52 | 95 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-----------------------|------------------------------|----------------------------------|------------------------------|
| RHODE ISLAND | | | |
| Newport | 30 | 35 | 125 |
| Providence | 30 | 41 | 120 |
| SOUTH CAROLINA | | | |
| Charleston | 5 | 0 | 125 |
| Fort Jackson | 10 | 0 | 90 |
| Parris Island | 0 | 0 | 120 |
| Shaw AFB | 10 | 0 | 90 |
| SOUTH DAKOTA | | | |
| Ellsworth AFB | 20 | 86 | 90 |
| Pierre | 35 | 114 | 90 |
| Sioux Falls | 40 | 102 | 90 |
| TENNESSEE | | | |
| Chattanooga | 10 | 9 | 90 |
| Holston AAP | 15 | 18 | 90 |
| Memphis | 10 | 9 | 90 |
| Milan AAP | 10 | 14 | 90 |
| Nashville | 10 | 22 | 90 |
| Seward AFB, Smyrna | 10 | 22 | 90 |
| TEXAS | | | |
| Amarillo | 15 | 20 | 90 |
| Austin/Bergstrom AFB | 5 | 4 | 90 |
| Brooks AFB | 5 | 0 | 90 |
| Carswell AFB | 5 | 7 | 90 |
| Corpus Christi | 0 | 0 | 125 |
| Dallas | 5 | 7 | 90 |
| Denton | 5 | 8 | 90 |
| Dyess AFB, Abilene | 5 | 7 | 90 |
| Eagle Pass | 0 | 3 | 90 |
| Ellington AFB | 0 | 0 | 110 |
| El Paso | 10 | 0 | 90 |
| Fort Bliss | 10 | 0 | 90 |
| Fort Hood | 5 | 6 | 90 |
| Fort Sam Houston | 5 | 0 | 90 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------------|------------------------------|----------------------------------|------------------------------|
| Fort Worth | 5 | 8 | 90 |
| Galveston | 0 | 0 | 125 |
| Goodfellow AFB | 5 | 5 | 90 |
| Houston | 0 | 0 | 110 |
| Kelly AFB | 5 | 0 | 90 |
| Kingsville | 0 | 0 | 115 |
| Kingsville NAS | 0 | 0 | 115 |
| Lackland AFB | 5 | 0 | 90 |
| Laredo | 0 | 0 | 90 |
| Laughlin AFB | 0 | 0 | 90 |
| Lone Star AAP | 5 | 8 | 90 |
| Longhorn AAP | 5 | 6 | 90 |
| Randolph AFB | 5 | 0 | - |
| Red River AD | 5 | 8 | 90 |
| Reese AFB | 20 | 9 | 90 |
| San Antonio | 5 | 0 | 90 |
| Sheppard AFB | 5 | 11 | 90 |
| Wichita Falls | 5 | 11 | 90 |
| UTAH | | | |
| Dugway P.G. | 10 | 54 | 90 |
| Hill AFB | 40 | 73 | 90 |
| Salt Lake City | 15 | 59 | 90 |
| Tooele Army Depot | 25 | 52 | 90 |
| VERMONT | | | |
| Bennington | 50 | 77 | 90 |
| Burlington | 40 | 107 | 90 |
| Montpelier | 70 | 107 | 90 |
| St. Albans (below 600 ft.) | 45 | 107 | 90 |
| VIRGINIA | | | |
| Fort Belvoir | 25 | 26 | 90 |
| Fort Eustis | 10 | 9 | 110 |
| Fort Myer | 25 | 26 | 90 |
| Langley AFB, Hampton | 10 | 9 | 110 |
| Norfolk | 10 | 9 | 110 |
| Petersburg/Fort Lee | 20 | 14 | 95 |
| Quantico | 25 | 22 | 90 |
| Radford AAP | 25 | 22 | 90 |
| Richmond | 20 | 18 | 90 |
| Virginia Beach Coast | 10 | 5 | 120 |
| Yorktown | 15 | 9 | 110 |

Table 1. Snow, Frost, and Wind Data Inside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-------------------------------|------------------------------|----------------------------------|------------------------------|
| WASHINGTON | | | |
| Bremerton | 15 | 9 | - |
| Fairchild AFB/ Spokane | 40 | 64 | 85 |
| Fort Lewis | 15 | 9 | - |
| Larson AFB, Moses Lake | 25 | 64 | 85 |
| McChord AFB | 15 | 9 | - |
| Pasco | 15 | 9 | 85 |
| Seattle | 20 | 9 | - |
| Tacoma | 15 | 9 | - |
| Walla Walla | 20 | 49 | 85 |
| Yakima | 30 | 52 | 85 |
| WASHINGTON, D.C. | | | |
| Bolling AFB | 25 | 26 | 90 |
| Fort McNair | 25 | 26 | 90 |
| Walter Reed AMC | 25 | 26 | 90 |
| WEST VIRGINIA | | | |
| Charleston | 20 | 22 | 90 |
| Sugar Grove | 30 | 38 | 90 |
| WISCONSIN | | | |
| Badger AAP | 35 | 98 | 90 |
| Fort McCoy | 40 | 114 | 90 |
| Green Bay | 40 | 94 | 90 |
| Madison | 35 | 75 | 90 |
| Milwaukee | 30 | 75 | 90 |
| Osceola | 60 | 135 | 90 |
| WYOMING | | | |
| Cheyenne | 20 | 59 | 90 |
| Yellowstone (below 7,500 ft.) | 120 | 125 | 90 |

(a) - Wind speed equals 125 mph in the south sector of Kirtland AFB. Wind speed equals 100 mph on the remainder of the base.

Table 2. Snow, Frost, and Wind Data Outside the United States

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|--|------------------------|----------------------------|------------------------|
| AFRICA | | | |
| Egypt | 0 | 0 | - |
| Libya | | | |
| Wheelus AB | 0 | 0 | 85 |
| Morocco | | | |
| Casablanca | 0 | 0 | 85 |
| Port Lyautey NAS | 0 | 0 | 85 |
| ASIA | | | |
| Bahrain | 0 | 0 | 80 |
| India | | | |
| Bombay | 0 | 0 | 85 |
| Calcutta | 0 | 0 | 105 |
| Madras | 0 | 0 | 85 |
| New Delhi | 0 | 0 | 85 |
| Japan | | | |
| Misawa AB | 40 | 30 | 95 |
| Okinawa | 0 | 0 | 180 |
| Tokyo | 10 | 6 | 100 |
| Wakkannai | 55 | 36 | 115 |
| Korea | | | |
| Kimpo AB | 20 | 48 | 80 |
| Seoul | 20 | 48 | 80 |
| Uijongbu | 15 | 48 | 80 |
| Kuwait | 0 | 0 | - |
| Oman | | | |
| Areas immediately South and West of Jabal Akehadar | 0 | 0 | 105 |
| Batinah Coast | 0 | 0 | 105 |
| Central, Southern and Coastal Areas | | | |
| Sur to Sarfait | 0 | 0 | 115 |
| High Jabal Locations | 0 | 0 | 115 |
| Kuria Muria Island | 0 | 0 | 120 |
| Masirah Island | 0 | 0 | 120 |
| Mussandam Island | 0 | 0 | 120 |

Table 2. Snow, Frost, and Wind Data Outside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------------|------------------------------|----------------------------------|------------------------------|
| Pakistan | | | |
| Peshawar | 10 | 6 | 85 |
| Saudi Arabia | | | |
| | 0 | 0 | 80 |
| Taiwan | | | |
| Tainan | 0 | 0 | 120 |
| Taipei | 0 | 0 | 130 |
| Thailand | | | |
| Chiang Mai | 0 | 0 | 80 |
| Bangkok | 0 | 0 | 80 |
| Sattahip | 0 | 0 | 85 |
| Udonthani | 0 | 0 | 80 |
| Turkey | | | |
| Ankara | 20 | 24 | 90 |
| Karamursel | 15 | 12 | 105 |
| Viet Nam | | | |
| Da Nang | 0 | 0 | 120 |
| Nha Trang | 0 | 0 | 95 |
| Saigon | 0 | 0 | 95 |
| ATLANTIC OCEAN AREA | | | |
| Ascension Island | | | |
| | 0 | 0 | 80 |
| Azores | | | |
| Lajes Field | 0 | 0 | 120 |
| Bermuda | | | |
| | 0 | 0 | 130 |
| CARIBBEAN SEA | | | |
| Bahama Islands | | | |
| Eleuthera Island | 0 | 0 | 140 |
| Grand Bahama Isle | 0 | 0 | 140 |
| Grand Turk Island | 0 | 0 | 150 |
| Great Exuma Island | 0 | 0 | 140 |
| Cuba | | | |
| Guantanamo NAS | 0 | 0 | 90 |

Table 2. Snow, Frost, and Wind Data Outside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|------------------------|------------------------------|----------------------------------|------------------------------|
| Leeward Islands | | | |
| Antigua Island | 0 | 0 | 140 |
| Puerto Rico | | | |
| Boringuen Field | 0 | 0 | - |
| Ramey AFB and Aguada | 0 | 0 | 95 |
| San Juan | 0 | 0 | 120 |
| Sabana Seca | 0 | 0 | 120 |
| Vieques Island | 0 | 0 | 140 |
| Roosevelt Roads | 0 | 0 | 140 |
| Trinidad Island | | | |
| Port of Spain | 0 | 0 | 80 |
| Trinidad NS | 0 | 0 | 80 |
| CENTRAL AMERICA | | | |
| Canal Zone | | | |
| Albrook AFB | 0 | 0 | 80 |
| Balboa | 0 | 0 | 80 |
| Coco Solo | 0 | 0 | 80 |
| Colon | 0 | 0 | 80 |
| Cristobal | 0 | 0 | 80 |
| France AFB | 0 | 0 | 80 |
| EUROPE | | | |
| England | | | |
| Birmingham | 15 | 12 | 85 |
| London | 15 | 12 | 90 |
| Mildenhall AB | 15 | 12 | 100 |
| Plymouth | 10 | 12 | 85 |
| Sculthorpe AB | 15 | 12 | 90 |
| Southport | 10 | 12 | 100 |
| South Shields | 15 | 12 | 90 |
| Spurn Head | 15 | 12 | 90 |
| France | | | |
| Nancy | 15 | 18 | 85 |
| Paris/LeBourget | 20 | 18 | 100 |
| Rennes | 15 | 18 | 100 |
| Vichy | 25 | 24 | 120 |

Table 2. Snow, Frost, and Wind Data Outside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|----------------------------|------------------------------|----------------------------------|------------------------------|
| Germany | | | |
| Bremen | 25 | 30 | 80 |
| Munich-Reim | 40 | 36 | 90 |
| Rhein-Main AB | 25 | 30 | 80 |
| Stuttgart AB | 45 | 36 | 85 |
| Greece | | | |
| Athens | 5 | 0 | 85 |
| Souda Bay | 5 | 0 | 80 |
| Iceland | | | |
| Keflavik | 30 | 24 | 120 |
| Thorshofn | 30 | 36 | 140 |
| Northern Sites | - | Permafrost | - |
| Italy | | | |
| Aviano AB | 10 | 18 | 85 |
| Brindisi | 5 | 6 | 100 |
| La Maddalena | - | - | 85 |
| Sigonella-Catania | - | - | 90 |
| Northern Ireland | | | |
| Londonderry, Ulster | 15 | 12 | 125 |
| Scotland | | | |
| Aberdeen | 15 | 12 | 85 |
| Edinburgh | 15 | 12 | 90 |
| Edzell | 15 | 12 | 85 |
| Glasgow/Renfrew Airfield | 15 | 12 | 90 |
| Lerwick, Shetland Islands | 15 | 18 | 10 |
| Prestwick | 15 | 12 | 90 |
| Stornoway | 15 | 12 | 115 |
| Thurso | 15 | 12 | 100 |
| Spain | | | |
| Madrid | 10 | 6 | 85 |
| Rota | 5 | 0 | 85 |
| San Pablo | 5 | 6 | 105 |
| Zaragoza | 10 | 6 | 105 |
| NORTH AMERICA | | | |
| Canada | | | |
| Argentia NAS, Newfoundland | 47 | 36 | 105 |
| Churchill, Manitoba | 66 | Permafrost | 100 |
| Cold Lake, Alberta | 41 | 72 | 80 |
| Edmonton, Alberta | 27 | 60 | 80 |

Table 2. Snow, Frost, and Wind Data Outside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-----------------------------|------------------------------|----------------------------------|------------------------------|
| E. Harmon AFB, Newfoundland | 86 | 60 | 105 |
| Fort William, Ontario | 73 | 60 | 80 |
| Frobisher, N.W.T. | 50 | Permafrost | 100 |
| Goose Airport, Newfoundland | 100 | 60 | 85 |
| Ottawa, Ontario | 60 | 48 | 85 |
| St John's, Newfoundland | 72 | 36 | 105 |
| Toronto, Ontario | 40 | 36 | 85 |
| Winnipeg, Manitoba | 45 | 60 | 80 |
| Greenland | | | |
| Narsarssuak AB | 30 | 60 | 130 |
| Simiutak AB | 25 | 60 | 155 |
| Sondrestrom AB | 20 | Permafrost | 110 |
| Thule AB | 25 | Permafrost | 130 |
| PACIFIC OCEAN AREA | | | |
| Australia | | | |
| H.E. Holt, NW Cape | 0 | 0 | 130 |
| Caroline Islands | | | |
| Koror, Palau Islands | 0 | 0 | 95 |
| Ponape | 0 | 0 | 110 |
| Johnston Island | 0 | 0 | 95 |
| Kwajalein Island | 0 | 0 | 100 |
| Mariana Islands | | | |
| Agana, Guam | 0 | 0 | 155 |
| Andersen AFB, Guam | 0 | 0 | 155 |
| Saipan | 0 | 0 | 150 |
| Tinian | 0 | 0 | 150 |
| Marcus Island | 0 | 0 | 150 |
| Midway Island | 0 | 0 | 85 |
| Philippine Islands | | | |
| Clark AFB | 0 | 0 | 90 |
| Sangley Point | 0 | 0 | 80 |
| Subic Bay | 0 | 0 | 80 |

Table 2. Snow, Frost, and Wind Data Outside the United States (cont'd)

| Location | Ground Snow Load (psf) | Frost Penetration (inches) | Basic Wind Speed (mph) |
|-------------------------|------------------------------|----------------------------------|------------------------------|
| Samoa Islands | | | |
| Apia, Upola Island | 0 | 0 | 150 |
| Tutuila, Tutuila Island | 0 | 0 | 150 |
| Volcano Islands | | | |
| Iwo Jima AB | 0 | 0 | 205 |
| Wake Island | 0 | 0 | 85 |