

# **Snow Load History of the Minnesota State Building Code**

- October 1972 - Roof snow load is 40 psf on a horizontal projected plane.**
- June/July 1973 - The state is divided into two regions for roof snow load, 40 psf and 30 psf. Also full and unbalanced snow loads were to be considered.**
- January 14, 1974- A reduction of the roof snow load is allowed for roofs pitched over 20 degrees. Appendix C addressed variations of snow loads, decreases and increases. It contained diagrams for drifting snow.**
- October 5, 1998 - The drifting snow requirements of 1997 Uniform Building Code, Appendix Chapter 16 were adopted with some modifications.**
- Mach 31, 2003 - The ground sow load was amended to 60 psf for the north half of the state and 50 psf for the southern half. The snow load and unbalanced snow load requirements of the 2000 International Building Code and 2000 International Residential Code were adopted with amendments.**
- July 10, 2007 - The ground snow load for Clay County was changed to 50 psf. The snow load and unbalanced snow load requirements of the 2006 International Building Code and 2006 International Residential Code were adopted with amendments.**

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**MINNESOTA STATE REGULATIONS**

**Rules and Regulations  
relating to**

**BUILDING CODE DIVISION**

**DEPARTMENT OF ADMINISTRATION**

OCTOBER 1972 SUPPLEMENT



*SBC 201 and 202*

**BUILDING CODES &  
STANDARDS DIVISION  
408 Metro Square Building  
7th & Robert Streets  
St. Paul, Minnesota 55101**

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**DOCUMENTS SECTION, DEPARTMENT OF ADMINISTRATION  
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(r) Section 1714 of the UBC is amended to read as follows:

Sec. 1714. All unenclosed floor and roof openings; open and glazed sides of landings and stairs; balconies or porches which are more than 30 inches above grade; and roofs used for other than service of the building shall be protected by a guardrail. Guardrails shall be not less than 42 inches in height. Open guardrails and stair railings shall have intermediate rails or an ornamental pattern such that no object 9 inches in diameter can pass through. Stair railings shall be not less than 30 inches above the nosing of treads.

EXCEPTION: In Group I Occupancies guardrails shall be not less than 36 inches in height.

(s) Section 2305(c) of the UBC is amended as follows:

(c) **Snow Loads.** All buildings shall be designed for a vertical line roof load of not less than 40 pounds per square foot of horizontal projection.

(t) Section 2314(a) of the UBC is amended as follows:

(a) **General.** For the purpose of this Code this State shall be considered to be in Zone "O", No Damage Area. Every building or structure and every portion thereof shall be designed and constructed to resist stresses produced by lateral forces as provided in this Section. Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the foundation. The force shall be assumed to come from any horizontal direction.

The provisions of this Section apply to the structure as a unit and also to all parts thereof, including the structural frame or walls, floor and roof systems, and other structural features.

(u) Section 2905(b) of the UBC is amended to read as follows:

(b) **Bearing Walls.** Bearing walls shall be supported on solid masonry or concrete footings or piles or other approved structural systems, which shall be of sufficient size to support all loads. Where a design is not provided, the minimum foundation requirements for stud bearing walls shall be as set forth in Table No. 29-A.

(v) Section 3001(b) of the UBC is amended as follows:

**Limitations.** Exterior veneer shall not be attached to wood frame construction at a point more than 25 feet in height above the adjacent ground elevation except when approved by the Building Official considering special construction designed to provide for differential movement.

(w) Section 3301(c) of the UBC is amended by adding the following definition after the definition of Exit Passageway and before the definition of Horizontal Exit:

**HIGH HAZARD BUILDING** is Group E, Division 1 and 2 Occupancy consisting of a building or buildings which are used for the storage, manufacture or processing of highly combustible or explosive products or materials which are likely to burn with extreme rapidity or which may produce poisonous fumes or explosions; for storage or manufacturing which involves highly corrosive toxic or noxious alkalies, acids or other liquids or chemicals producing flame, fumes, explosives, poisonous irritant or corrosive gases; and for the storage or processing of any materials producing explo-

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*(Insert following front cover of code book)*

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1973 AMENDMENTS



*Filing dates shown following  
each amendment*

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**BUILDING CODES &  
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408 Metro Square Building

*(Insert opposite page 9)*

UBC Section 2305 is amended to read as follows:

(c) Snow loads full or unbalanced shall be considered where loading will result in larger members or connections. A basic snow load of 40 pounds per square foot of horizontal projection is required in the following counties: Anoka, Carlton, Carver, Chisago, Cook, Dakota, Hennepin, Isanti, Lake, Pine, Ramsey, St. Louis, Scott and Washington. A basic snow load of 30 pounds per square foot of horizontal projection is required for all other counties not mentioned above.

*Filed June 26, 1973*

UBC Sec. 3206(a)1, is amended to read as follows:

In single story Groups G and F-2 Occupancies having over 50,000 square feet in undivided area.

**EXCEPTION:** Office buildings and retail sales areas.

*Filed April 5, 1973*

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**Rules and Regulations  
relating to**

**BUILDING CODE DIVISION  
DEPARTMENT OF ADMINISTRATION**



**AMENDMENTS TO THE STATE BUILDING CODE  
INCLUDING THE ADOPTION OF THE 1973 UNIFORM  
BUILDING CODE (with amendments)**

**FILED WITH THE SECRETARY OF STATE AND THE COMMISSIONER  
OF ADMINISTRATION**

**JANUARY 14, 1974**



**BUILDING CODES &  
STANDARDS DIVISION  
408 Metro Square Building  
7th & Robert Streets**

**SBC 203 Adoption of "Flood Proofing Regulations by Reference.** See separate publication for amendments to "Flood Proofing Regulations, Office of the Chief of Engineers, U.S. Army, Washington, D.C."

**SBC APPENDIX C** is deleted and replaced by the following:

**Appendix C: Variations of Snow Loads.** The minimum snow loads for the design of both ordinary and multiple series roofs, either flat, pitched or curved, shall be determined by multiplying the appropriate snow load given in Section 2305(c) by the appropriate coefficients  $C_s$  (See Figures 1, 2, 3 and 4). The full intensity of the roof snow load shall be applied to any one contiguous portion of the roof area if it produces a more unfavorable effect than the full intensity applied over the entire roof area. The basic snow load coefficient  $C_s$  shall be increased or decreased in accordance with the following conditions:

1. Decreases

- A. A decrease (due to slide-off of snow load) on the horizontal projection of pitched roofs, of one pound per square foot for each degree, by which the slope angle exceeds 20 degrees. In no case shall the allowable design load be less than 20 pounds per square foot.

TABLE OF PITCH VS. DEGREE:

<u>PITCH</u>	<u>DEGREES</u>
2/12	9°-28'
2½/12	11°-46'
3/12	14°-2'
3½/12	16°-15½'
4/12	18°-26'
4½/12	20°-33'
5/12	22°-37'
5½/12	24°-37'
6/12	26°-34'

- B. A decrease of 20 per cent of the basic uniform snow load may be used for rounded (arch) roofs with a ratio of rise to span between  $\frac{1}{8}$  and  $\frac{3}{8}$ . Roofs with rise to span ratio equal to or greater than  $\frac{3}{8}$ , the basic uniform snow load may be reduced 40 per cent. In no case shall the allowable uniform snow load be less than 20 pounds per square foot.

2. **Increases.** The basic roof loads shall be increased for the following conditions:

- A. **Roof Valley Condition** in accordance with Figure No. 1 and applicable load cases.

- B. Roof areas abutting vertical walls, of adjacent buildings in accordance with Figure No. 2 and applicable formulas.
- C. Lower level roof areas abutting sloping upper roof areas in accordance with Figure No. 3 and applicable descriptive conditions.
- D. Roof areas adjacent to or containing projections and/or obstructions in accordance with Figure No. 4 and applicable formulas.

NOTE: Figures No. 1, No. 2, No. 3 and No. 4 as shown.

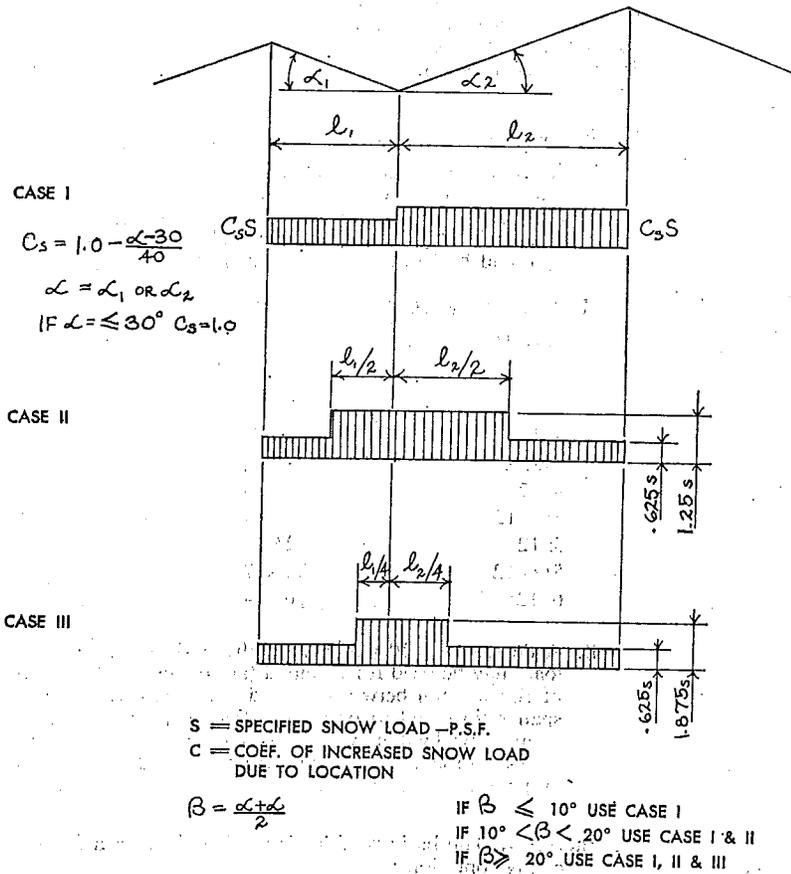
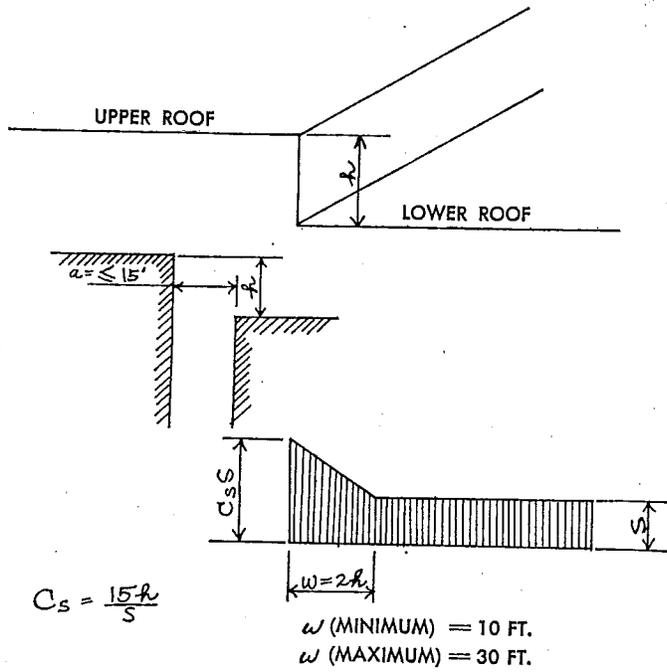


FIGURE NO. 1  
 VALLEY AREA OF SLOPED ROOFS



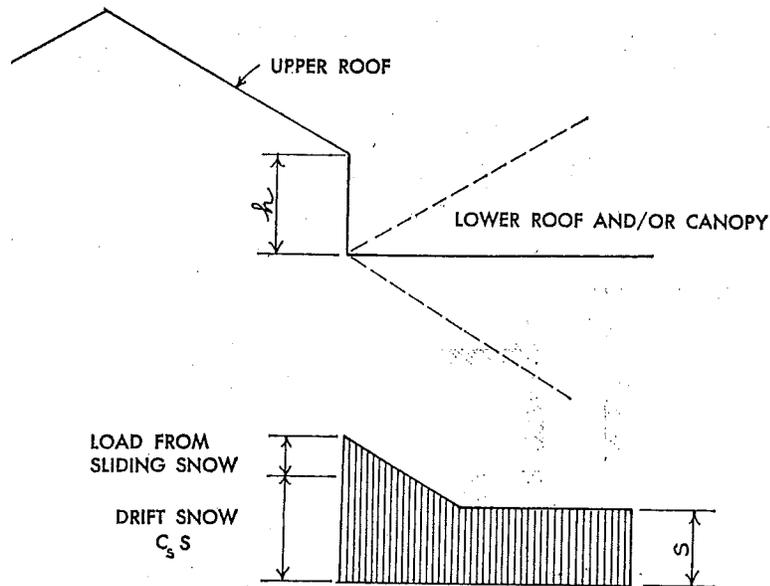
$$C_s = \frac{15h}{S}$$

w (MINIMUM) = 10 FT.  
w (MAXIMUM) = 30 FT.

- IF  $\frac{15h}{S} < 1.0$   $C_s = 1.0$  IF  $h < .5 \text{ FT.}$   $w = 10 \text{ FT.}$   
 IF  $\frac{15h}{S} > 3.0$   $C_s = 3.0$  IF  $h > 15 \text{ FT.}$   $w = 30 \text{ FT.}$

$h$  = HEIGHT DIFFERENCE IN ROOFS IN FEET  
 $w$  = WIDTH OF DRIFT IN FEET  
 $a$  = DISTANCE BETWEEN BUILDINGS IN FEET  
 $S$  = SPECIFIED SNOW LOAD IN P.S.F.  
 $C_s$  = COEFFICIENT OF INCREASED SNOW LOAD

FIGURE NO. 2  
 LOWER LEVEL OF MULTI-LEVEL ROOFS

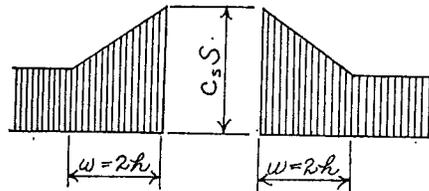
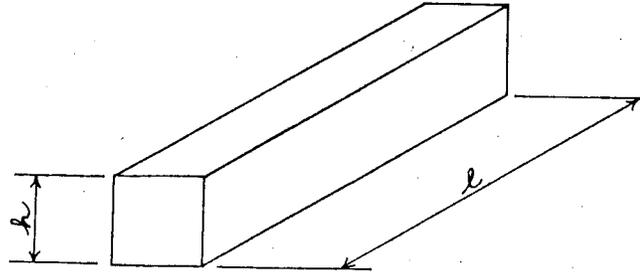


DESIGN LOWER ROOF OR CANOPY FOR LOADS ACCORDING TO FIGURE 11 + 50% OF DESIGN LOAD FROM UPPER. THE DISTRIBUTION SHOULD BE MADE DEPENDING ON THE RELATIVE SIZES, SLOPES AND POSITIONS OF THE TWO ROOFS.

IF, BECAUSE OF A RELATIVELY SMALL LOWER ROOF OR CANOPY, ALL OF THE SLIDING SNOW CANNOT BE RETAINED, APPROPRIATE REDUCTIONS MAY BE MADE. THE DENSITY OF SLIDING SNOW MAY BE RATHER HIGH.

DESIGN UPPER ROOF AS THOUGH IT IS A SINGLE SPAN BUILDING.

FIGURE NO. 3  
LOWER ROOF WITH SLOPING UPPER ROOF



$w$  (MINIMUM) = 10 FEET

$w$  (MAXIMUM) = 30 FEET

$$C_s = \frac{10h}{S}$$

IF  $\frac{10h}{S} < 1.0$   $C_s = 1.0$

IF  $\frac{10h}{S} > 2.5$   $C_s = 2.5$

IF  $l < \frac{S}{4.8}$   $C_s = 1.0$

IF  $h < 5$  FEET  $w = 10$  FEET

IF  $h > 15$  FEET  $w = 30$  FEET

$h$  = HEIGHT OF OBSTRUCTION IN FEET

$w$  = WIDTH OF DRIFT IN FEET

$l$  = LENGTH OF OBSTRUCTION OR PROJECTION IN FEET

$S$  = SPECIFIED SNOW LOAD IN P.S.F.

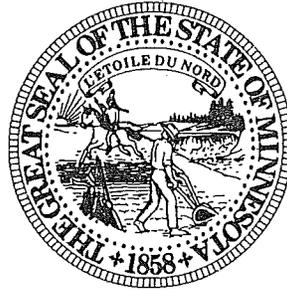
$C$  = COEFFICIENT OF INCREASED SNOW LOAD

FIGURE NO. 4  
PROJECTIONS AND OBSTRUCTIONS

**Department of Administration  
Building Codes and Standards Division**

**Minnesota State Building Code**

*Extracted from Minnesota Rules 1998*



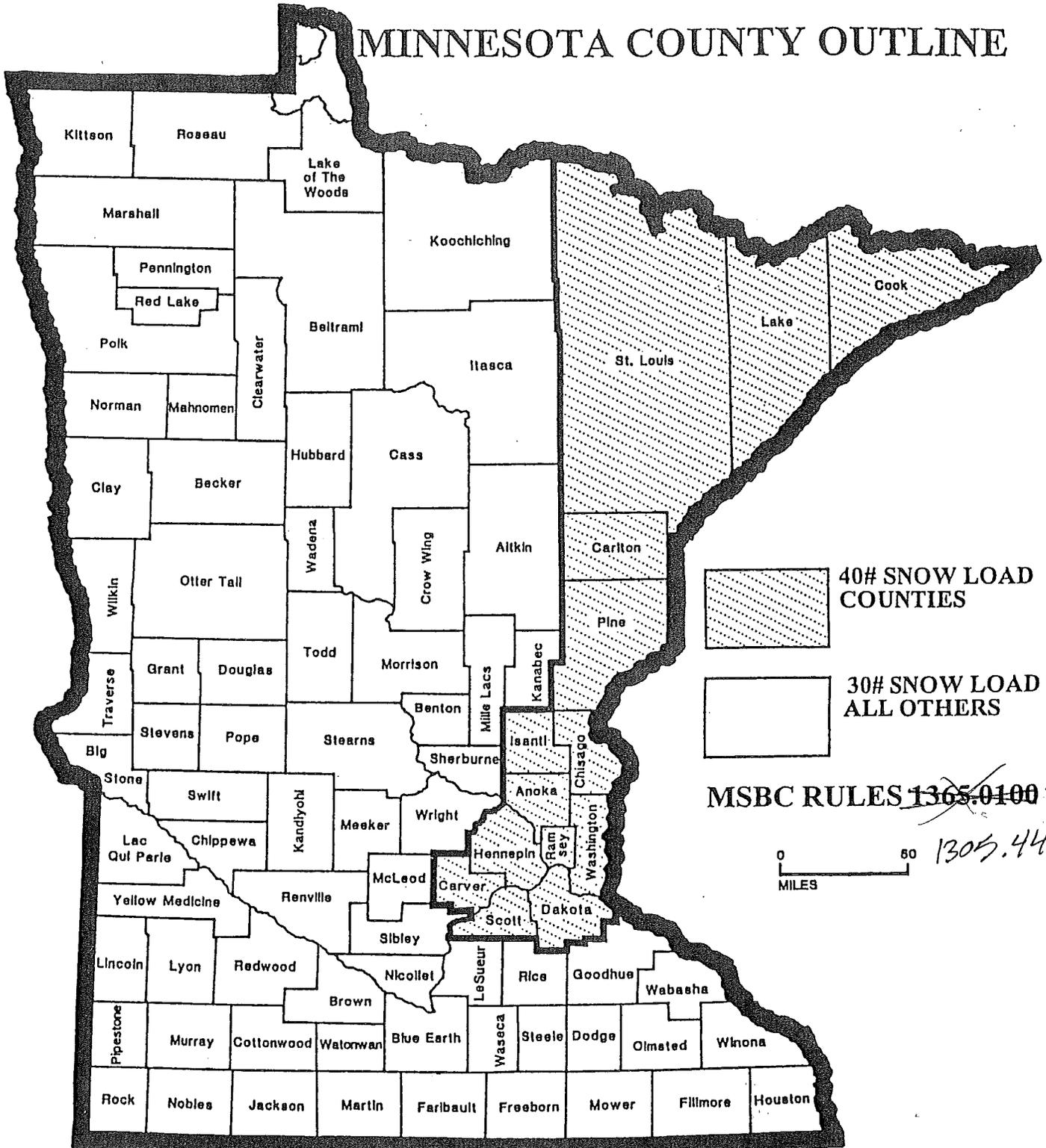
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# SNOW LOAD

## MINNESOTA COUNTY OUTLINE



12. All references to design values for joists, rafters, and those in Header Tables R-402.6a and R-402.6b are deleted and replaced with UBC Tables 23-IV-V-1 and 23-IV-V-2.

SA: MS s 16B.59 to 16B.75

HIST: 19 SR 1340; 23 SR 683

**1305.4415 UBC APPENDIX CHAPTER 15, REROOFING.**

Subpart 1. Chapter 15. UBC Appendix Chapter 15 is amended by deleting the first paragraph of section 1515.1, 1515.2.1, and the subheading under the title of Table A-15-A.

Subp. 2. Section 1520. UBC Appendix Section 1520 is amended by deleting all but the first sentence.

SA: MS s 16B.59 to 16B.75

HIST: 23 SR 683

**1305.4416 UBC APPENDIX CHAPTER 16, DIVISION I, SNOW LOAD DESIGN.**

UBC Appendix Section 1637.1 is amended by adding an exception to read as follows:

Exception: The minimum roof snow loads established herein for R-3 and U occupancies are not subject to decrease or increase as specified in this chapter.

UBC Appendix Section 1638 is amended by changing the reference in notation  $W_b$ , 500 feet, to 200 feet.

UBC Appendix Section 1639 is amended to read as follows:

The ground snow load,  $P_g$ , to be used in the determination of design snow loads for buildings and other structures shall be 57 pounds per square foot in the following counties: Anoka, Carlton, Carver, Chisago, Cook, Dakota, Hennepin, Isanti, Lake, Pine, Ramsey, St. Louis, Scott, and Washington. The ground snow load,  $P_g$ , to be used in the determination of design snow loads for buildings and other structures shall be 43 pounds per square foot in all other counties.

Exceptions:

1. A minimum roof snow load of 40 pounds per square foot of horizontal projection shall be acceptable for R-3 occupancies in the counties of Anoka, Carlton, Carver, Chisago, Cook, Dakota, Hennepin, Isanti, Lake, Pine, Ramsey, St. Louis, Scott, and Washington. A minimum roof snow load of 30 pounds per square foot of horizontal projection shall be acceptable for R-3 occupancies in all counties.

2. A minimum <sup>of the</sup> roof snow load of 30 pounds per square foot of horizontal projection shall be acceptable for detached Group U occupancies in all counties.

UBC Appendix Section 1645 is deleted in its entirety.

UBC Table A-16-A, Snow Exposure Coefficient ( $C_e$ ), is deleted and replaced with the following:

The snow exposure coefficient ( $C_e$ ) for all of Minnesota is established as 0.7.

UBC Table A-16-B, Values for Occupancy Importance Factor ( $I$ ) is deleted, and replaced with the following:

The occupancy importance factor (I) for all of Minnesota is established as 1.0.

SA: MS s 16B.59 to 16B.75

HIST: 23 SR 683

**1305.4429 UBC APPENDIX CHAPTER 29, MINIMUM PLUMBING FIXTURES.**

UBC Appendix Section 2905 is amended by adding the following:

Exceptions:

1. Where circumstances dictate that a different ratio is needed, an adjustment may be approved by the building official.

2. The actual number of students can be used in lieu of the 50 square feet per occupant specified in Group E, Division 1 occupancy areas. For assembly occupancies in conjunction with a Group E, Division 1 occupancy, refer to Group A of Table A-29-A.

Sanitation facilities required by this chapter may have controlled access but in all cases shall be maintained available during the time of building occupancy for those occupants e.g., clientele, employees, customers, etc., determined in accordance with Table A-29-A.

SA: MS s 16B.59 to 16B.75

HIST: 19 SR 1340; 23 SR 683

1305.4500 [Repealed, 15 SR 74]

1305.4600 [Repealed, 19 SR 1340]

1305.4700 [Repealed, 19 SR 1340]

1305.4800 [Repealed, 19 SR 1340]

1305.4850 [Repealed, 19 SR 1340]

1305.4900 [Repealed, 15 SR 74]

1305.5000 [Repealed, 11 SR 1405]

1305.5100 [Repealed, 11 SR 1405; 19 SR 1340]

1305.5101 [Renumbered 1307.0010]

1305.5102 [Renumbered 1307.0015]

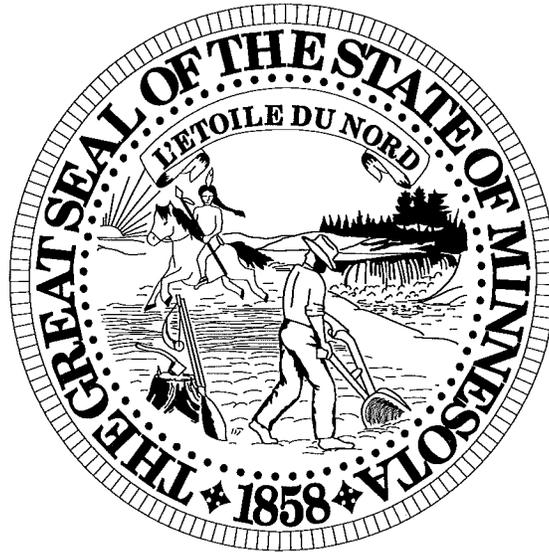
1305.5103 [Renumbered 1307.0020]

1305.5104 [Renumbered 1307.0025]

1305.5105 [Renumbered 1307.0030]

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2003  
MINNESOTA STATE BUILDING CODE



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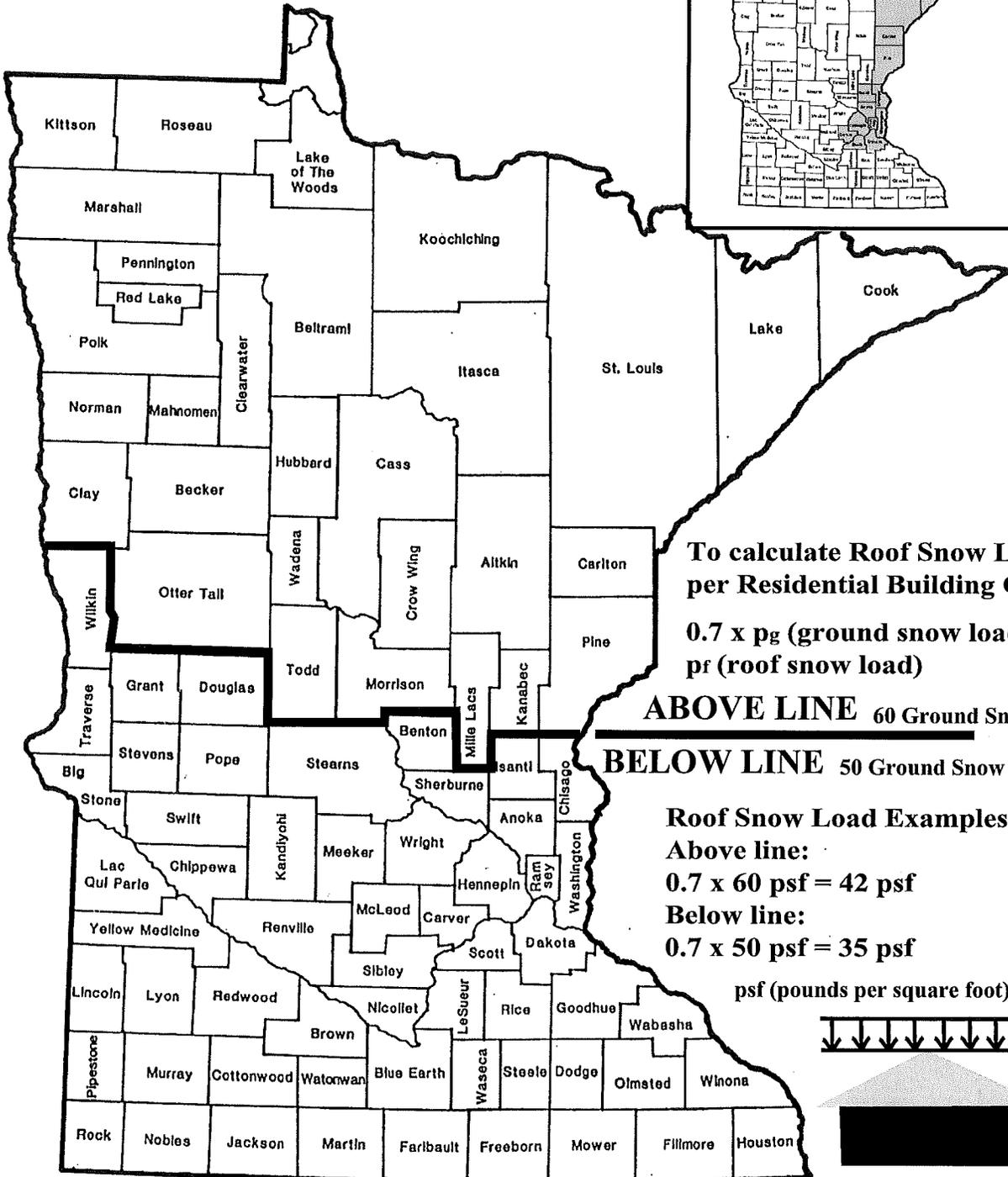
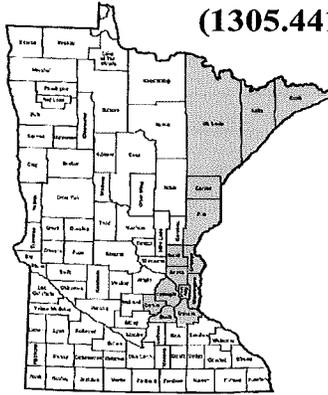
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# SNOW LOAD

GROUND SNOW LOAD & ROOF SNOW LOAD

MSBC RULES 1303.1700 table R301.2(1)

**Previous Snow Load:**  
(1305.4416)



To calculate Roof Snow Load  
per Residential Building Code:  
 $0.7 \times p_g$  (ground snow load) =  
 $p_f$  (roof snow load)

**ABOVE LINE** 60 Ground Snow PSF

**BELOW LINE** 50 Ground Snow PSF

**Roof Snow Load Examples:**

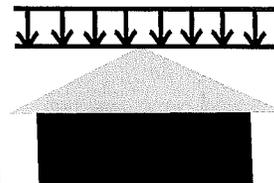
Above line:

$$0.7 \times 60 \text{ psf} = 42 \text{ psf}$$

Below line:

$$0.7 \times 50 \text{ psf} = 35 \text{ psf}$$

psf (pounds per square foot)



Mahnomen, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Todd, Traverse, Wadena, and Wilkin.

Zone II shall include the counties of: Anoka, Benton, Big Stone, Blue Earth, Brown, Carver, Chippewa, Chisago, Cottonwood, Dakota, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Isanti, Jackson, Kandiyohi, Lac qui Parle, Le Sueur, Lincoln, Lyon, McLeod, Martin, Meeker, Mower, Murray, Nicollet, Nobles, Olmsted, Pipestone, Pope, Ramsey, Redwood, Renville, Rice, Rock, Scott, Sibley, Sherburne, Stearns, Steele, Stevens, Swift, Wabasha, Waseca, Washington, Watonwan, Winona, Wright, and Yellow Medicine.

Less depths may be permitted when supporting evidence is presented by an engineer competent in soil mechanics.

**Subp. 2. Soil under slab on grade construction for buildings.** When soil, natural or fill, is sand or pit run sand and gravel, and of depth in accordance with minimum footing depth requirements for each zone, slab on grade construction which is structurally designed to support all applied loads is permitted. Sand must contain less than 70 percent material that will pass through a U.S. Standard No. 40 sieve and less than five percent material that will pass through a No. 200 sieve (five percent fines), or be approved by an engineer competent in soil mechanics. Footings for interior bearing walls or columns may be constructed to be integral with the slab on grade for any height building. Footings for exterior bearing walls or columns may be similarly constructed for any height building when supporting soil is as described in this subpart. Footing design must reflect eccentric loading conditions at slab edges, soil bearing capacity, and the requirements of International Building Code, chapter 19. Slab on grade construction for detached buildings of Group U occupancies may be placed on any soil except peat or muck.

### **1303.1700 GROUND SNOW LOAD.**

The ground snow load,  $P_g$ , to be used in determining the design snow loads for buildings and other structures shall be 60 pounds per square foot in the following counties: Aitkin, Becker, Beltrami, Carlton, Cass, Clay, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kanabec, Kittson, Koochiching, Lake, Lake of the Woods, Mahnomen, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Todd, and Wadena. The ground snow load,  $P_g$ , to be used in determining the design snow loads for buildings and other structures shall be 50 pounds per square foot in all other counties.

### **1303.1800 RADIAL ICE ON TOWERS.**

The effect of one-half inch of radial ice must be included in the design of towers including all supporting guys. This effect must include the weight of the ice and the increased profile of each such tower component so coated.

### **1303.1900 CONVENTIONAL FOUNDATION CONSTRUCTION.**

**Subpart 1. Conventional foundation construction.** The provisions in this part may be used for the design and construction of conventional foundations serving Group R, Division 3, and Group U occupancies subject to the approval of the building official. Other methods may be used provided a satisfactory design is submitted showing compliance with the other provisions of this code.

### **1305.1600 Repealed**

### **1305.1604 SECTION 1604, GENERAL DESIGN REQUIREMENTS.**

Subpart 1. **Section 1604.5.** IBC Section 1604.5 is amended to read as follows:

**1604.5 Importance factors.** The value for snow load and wind load shall be 1.0.

Subp. 2. **Table 1604.5.** IBC Table 1604.5 Classification of Buildings and Other Structures for Importance Factors is deleted in its entirety.

### **1305.1607 SECTION 1607, LIVE LOADS.**

Subpart 1. **Section 1607.11.1.** IBC Section 1607.11.1 is deleted.

Subp. 2. **Section 1607.12.2.** IBC Section 1607.12.2 is amended to read as follows:

**1607.12.2 Vertical impact force.** The maximum wheel loads of the crane shall be increased by the percentages shown below to determine the induced vertical impact or vibration force. Impact load shall be applied to one hoist system at a time for multiple hoist or bridge systems.

Monorails, underhung bridge cranes and pendant operated top running bridge cranes:

15 percent minimum for hoist lift speeds of less than 30 feet per minute.

Percentage equivalent to 0.5 times the hoist lift speed, for lift speeds of 30 to 100 feet per minute.

50 percent maximum for hoist lift speeds greater than 100 feet per minute.

50 percent for magnetic pickup or vacuum lift type systems.

No impact load is required for hand chain (non-powered) hoists.

Cab operated or remotely operated top running bridge cranes:

25 percent minimum.

Subp. 3. **Section 1607.12.3.** IBC Section 1607.12.3 is amended to read as follows:

### **1607.12.3 Lateral force.**

Top running powered bridge cranes. The lateral force on top running crane runway beams with powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed according to the lateral stiffness of the runway beam and supporting structure. The runway beams shall be designed for the lateral and torsional loads, as well as for the maximum lateral deflection limit of Span/800.

Monorails and underhung bridge cranes.

The bridge girder, underhung bridge crane runway beam and monorails shall be designed with sufficient strength and rigidity to prevent detrimental lateral deflection.

The lateral deflection should not exceed span/800 based on 5 percent of maximum wheel load(s) without vertical impact factor.

### **1305.1608 SECTION 1608, SNOW LOADS.**

Subpart 1. **Section 1608.2.** IBC Section 1608.2 is amended to read as follows:

**1608.2 Ground snow loads.** The ground snow loads to be used in determining the design snow loads for buildings and other

structures are given in Minnesota Rules, chapter 1303.

Subp. 2. **Figure 1608.2.** IBC Figure 1608.2 on GROUND SNOW LOADS,  $p_g$ , FOR THE UNITED STATES (PSF) is deleted.

Subp. 3. **Section 1608.5.** IBC Section 1608.5 is deleted.

#### **1305.1704 renumbered 1305.1616**

#### **1305.1701 See rule 1305.1702 SECTION 1702, DEFINITIONS.**

The definition of "approved agency" in IBC Section 1702.1 is amended to read as follows:

**APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved. The structural engineer of record, that engineer's employee or that engineer's agent may conduct tests or furnish inspection services for types of work for which the engineer, employee, or agent is qualified.

#### **1305.1704 SECTION 1704, SPECIAL INSPECTIONS.**

Subpart 1. **Section 1704.4.** IBC Section 1704.4 is amended by modifying Exception 4 to read as follows:

4. Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).

Subp. 2. **Table 1704.4.** IBC Table 1704.4 is amended by modifying item 6 in the table to read as follows:

kN/m.0<sup>2</sup>, 1 mile per hour = 1.609 km/h

**1309.0201 SECTION R201, GENERAL.**

IRC Section R201.4 is amended to read as follows:

**R201.4 Terms not defined.** Where terms are not defined through the methods authorized by this chapter, the Merriam-Webster Collegiate Dictionary, available at www.m-w.com, shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

STAT AUTH: MS s 16B.59; 16B.61; 16B.64

HIST: 27 SR 1475

**1309.0202 SECTION R202, DEFINITIONS.**

IRC Section R202 is amended by adding the following definition:

**CRAWL SPACE.** Areas or rooms with less than 7 feet (2134 mm) ceiling height measured to the finished floor or grade below.

STAT AUTH: MS s 16B.59; 16B.61; 16B.64

HIST: 27 SR 1475

**1309.0301 SECTION R301, DESIGN CRITERIA.**

Subpart 1. **Table R301.2(1).** IRC Table R301.2(1) is amended to read as follows:

**TABLE R301.2(1)**

**Climatic and Geographic Design Criteria**

Roof Snow Load <sup>d</sup>	Wind Speed <sup>e</sup> (mph)	Weathering	Subject to Damage from:	
			Frost Line Depth <sup>b</sup>	Flood Hazards
ps = 0.7 x ps	90	severe	See M.R. part 1303.1600	See M.R. chapter 1335

For SI: 1 pound per square foot = 0.0479

a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirement of this code. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216, or C 652.

b. The frost line depth may require deeper footings than indicated in Figure R403.1(1)

c. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

d. The ground snow loads to be used in determining the design snow loads for buildings and other structures are given in Minnesota Rules, chapter 1303.

Subp. 2. **Figure R301.2(5).** IRC Figure R301.2(5), Ground Snow Loads, Pg, for the United States (lb/ft<sup>2</sup>), is deleted in its entirety.

STAT AUTH: MS s 16B.59; 16B.61; 16B.64

HIST: 27 SR 1475

**1309.0305 SECTION R305, CEILING HEIGHT.**

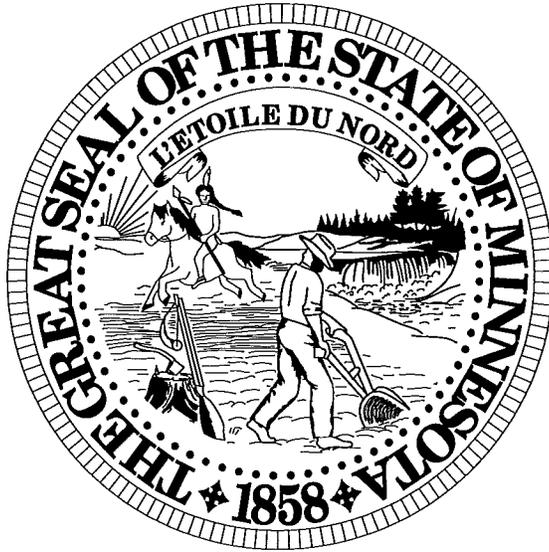
IRC Section R305.1 is amended to read as follows:

**R305.1 Minimum height.** Habitable rooms, hallways, corridors, bathrooms, toilet rooms, and basements shall have a ceiling height of not less than 7 feet (2134 mm). The required height shall be measured from the finish floor to the lowest projection from the ceiling. Areas or rooms with ceiling heights less than 7 feet (2134 mm) are considered crawl spaces.

**Exceptions:**

1. Beams and girders spaced not less than 4 feet (1219 mm) on center may project not

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MINNESOTA STATE BUILDING CODE



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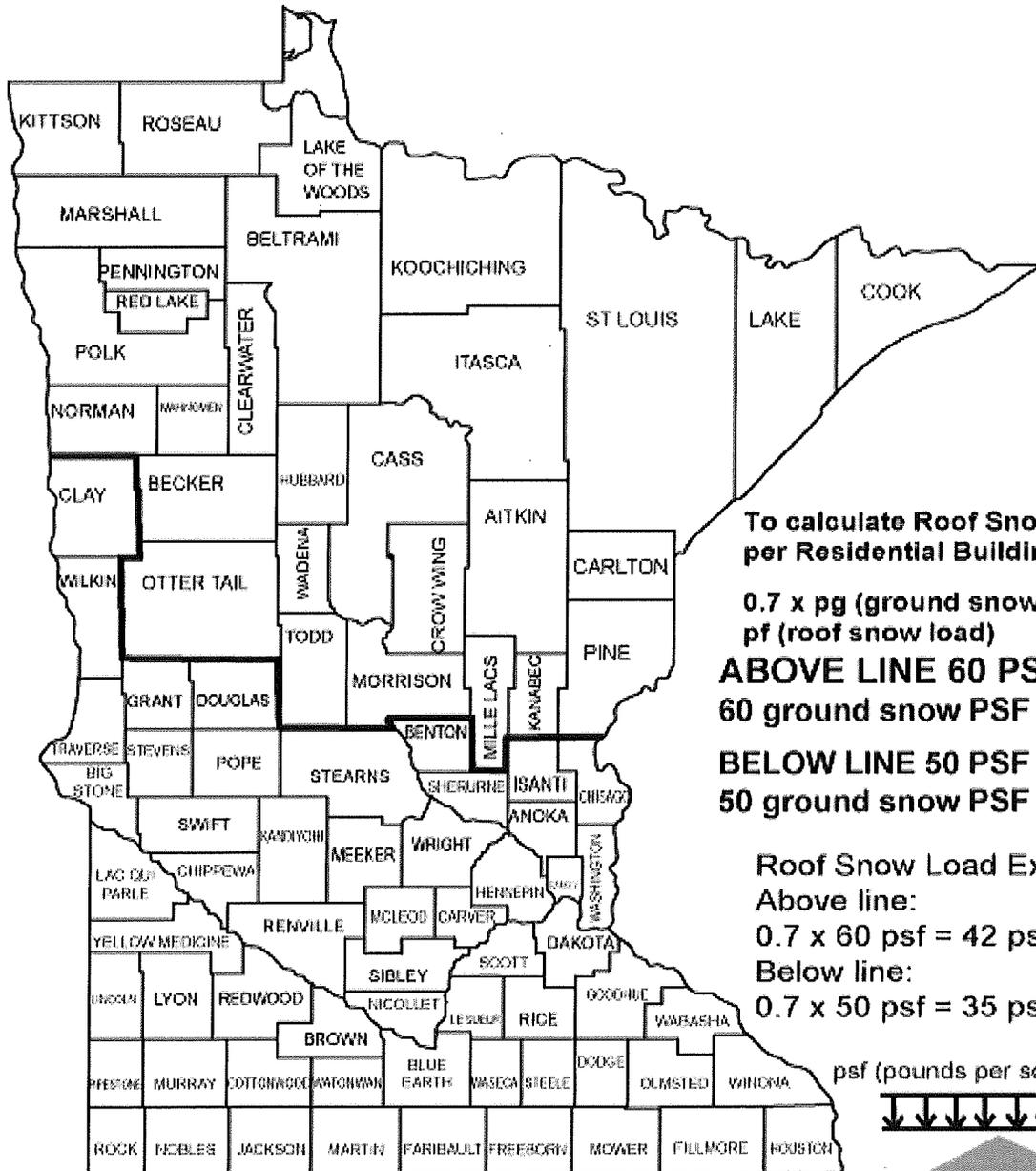


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# SNOW LOAD

MSBC RULES 1303.1700 table R301.2(1)



To calculate Roof Snow Load per Residential Building Code:

$$0.7 \times p_g \text{ (ground snow load)} = p_f \text{ (roof snow load)}$$

**ABOVE LINE 60 PSF**

60 ground snow PSF

**BELOW LINE 50 PSF**

50 ground snow PSF

Roof Snow Load Examples:

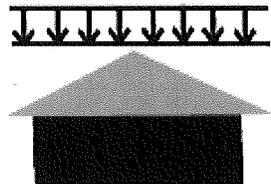
Above line:

$$0.7 \times 60 \text{ psf} = 42 \text{ psf}$$

Below line:

$$0.7 \times 50 \text{ psf} = 35 \text{ psf}$$

psf (pounds per square foot)



Zone I includes the counties of: Aitkin, Becker, Beltrami, Carlton, Cass, Clay, Clearwater, Cook, Crow Wing, Douglas, Grant, Hubbard, Itasca, Kanabec, Kittson, Koochiching, Lake, Lake of the Woods, Mahnomen, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Todd, Traverse, Wadena, and Wilkin.

Zone II shall include the counties of: Anoka, Benton, Big Stone, Blue Earth, Brown, Carver, Chippewa, Chisago, Cottonwood, Dakota, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Isanti, Jackson, Kandiyohi, Lac qui Parle, Le Sueur, Lincoln, Lyon, McLeod, Martin, Meeker, Mower, Murray, Nicollet, Nobles, Olmsted, Pipestone, Pope, Ramsey, Redwood, Renville, Rice, Rock, Scott, Sibley, Sherburne, Stearns, Steele, Stevens, Swift, Wabasha, Waseca, Washington, Watonwan, Winona, Wright, and Yellow Medicine.

Less depths may be permitted when supporting evidence is presented by an engineer competent in soil mechanics.

Subp. 2. **Soil under slab on grade construction for buildings.** When soil, natural or fill, is sand or pit run sand and gravel, and of depth in accordance with minimum footing depth requirements for each zone, slab on grade construction which is structurally designed to support all applied loads is permitted. Sand must contain less than 70 percent material that will pass through a U.S. Standard No. 40 sieve and less than five percent material that will pass through a No. 200 sieve (five percent fines), or be approved by an engineer competent in soil mechanics.

**Exception:** Slab on grade construction may be placed on any soil except peat or muck for detached one story private garage, carport, and shed buildings not larger than 3,000 square feet.

Footings for interior bearing walls or columns may be constructed to be integral with the slab on grade for any height building. Footings for exterior bearing walls or columns may be similarly constructed for any height building when supporting soil is as described in this subpart. Footing design must reflect eccentric loading conditions at slab edges, soil bearing capacity, and the requirements of International Building Code, chapter 19.

### **1303.1700 GROUND SNOW LOAD.**

The ground snow load,  $P_g$ , to be used in determining the design snow loads for buildings and other structures shall be 60 pounds per square foot in the following counties: Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kanabec, Kittson, Koochiching, Lake, Lake of the Woods, Mahnomen, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Todd, and Wadena. The ground snow load,  $P_g$ , to be used in determining the design snow loads for buildings and other structures shall be 50 pounds per square foot in all other counties.

### **1303.1800 RADIAL ICE ON TOWERS.**

The effect of one-half inch of radial ice must be included in the design of towers including all supporting guys. This effect must include the weight of the ice and the increased profile of each such tower component so coated.

### **1303.1900 [Repealer]**

### **1303.2000 EXTERIOR WOOD DECKS, PATIOS, AND BALCONIES.**

The decking surface and upper portions of exterior wood decks, patios, and balconies may be constructed of any of the following materials:

**1305.1600 [Repealed, 19 SR 1340]**

**1305.1604 [Repealed, 31 SR1165]**

**1305.1607 SECTION 1607, LIVE LOADS.**

Subpart 1. **Repealed, 31 SR 1165**

Subp. 2. **Section 1607.12.2.** IBC Section 1607.12.2 is amended to read as follows:

**1607.12.2 Vertical impact force.** The maximum wheel loads of the crane shall be increased by the percentages shown below to determine the induced vertical impact or vibration force. Impact load shall be applied to one hoist system at a time for multiple hoist or bridge systems.

Monorails, underhung bridge cranes and pendant operated top running bridge cranes:

15 percent minimum for hoist lift speeds of less than 30 feet per minute.

Percentage equivalent to 0.5 times the hoist lift speed, for lift speeds of 30 to 100 feet per minute.

50 percent maximum for hoist lift speeds greater than 100 feet per minute.

50 percent for magnetic pickup or vacuum lift type systems.

No impact load is required for hand chain (non-powered) hoists.

Cab operated or remotely operated top running bridge cranes:

25 percent minimum.

Subp. 3. **Section 1607.12.3.** IBC Section 1607.12.3 is amended to read as follows:

**1607.12.3 Lateral force.**

Top running powered bridge cranes. The lateral force on top running crane runway beams with powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed according to the lateral stiffness of the runway beam and supporting structure. The runway beams shall be designed for the lateral and torsional loads, as well as for the maximum lateral deflection limit of Span/800.

Monorails and underhung bridge cranes.

The bridge girder, underhung bridge crane runway beam and monorails shall be designed with sufficient strength and rigidity to prevent detrimental lateral deflection.

The lateral deflection should not exceed span/800 based on 5 percent of maximum wheel load(s) without vertical impact factor.

**1305.1608 SECTION 1608, SNOW LOADS.**

Subpart 1. **Section 1608.2.** IBC Section 1608.2 is amended to read as follows:

**1608.2 Ground snow loads.** The ground snow loads to be used in determining the design snow loads for buildings and other structures are given in Minnesota Rules, chapter 1303.

Subp. 2. **Figure 1608.2.** IBC Figure 1608.2 on GROUND SNOW LOADS, pg, FOR THE UNITED STATES (PSF) is deleted.

Subp. 3. **Repealed, 31 SR 1165**

**1305.1614 [Renumbered 1305.1616]**

**1305.1616 [Renumbered 1305.1618]**

IRC 2 and IRC 3 buildings less than or equal to 9,250 square feet of floor area. Floor area shall include all floors, basements, and garages.

separating the dwelling unit and the attached garage.

**R301.1.4.1 State licensed facilities.** IRC 1, IRC 2, and IRC 3 buildings containing facilities licensed by the state of Minnesota shall be provided with a fire suppression system as required by the applicable licensing provisions or this section, whichever is more restrictive.

Attached covered patios, covered decks, covered porches, and similar structures are required to have automatic sprinklers with a minimum of one dry head for every 20 lineal feet of common wall between the dwelling unit and the covered patios, covered decks, covered porches, and similar structures.

**Exception:**

**R301.1.4.2 Installation requirements.**

Where an automatic sprinkler system is required in an IRC 2 and IRC 3 building, it shall be installed in accordance with NFPA 13D 2002 edition and the following:

Attached roofs of covered patios, covered decks, covered porches, and similar structures that do not exceed 40 square feet of floor area.

Attached garages are required to have automatic sprinklers with a minimum of one dry head, located within five lineal feet of each door installed in the common wall

For the purposes of this section, fire resistance rated floor, wall, or ceiling assemblies separating dwelling units of IRC 2 and IRC 3 buildings shall not constitute separate buildings.

Subp. 2. **Table R301.2(1).** IRC Table R301.2(1) is amended to read as follows:

Table R301.2(1)

Climatic and Geographic Design Criteria

Roof Snow Load <sup>d</sup> $p_f = 0.7 \times p_g$	Wind Speed <sup>c</sup> (mph)	Weathering <sup>a</sup>	Subject to Damage From	
			Frost Line Depth <sup>b</sup>	Flood Hazards
	90	Severe	See M.R. chapter 1303	See M.R. chapter 1335

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h

- a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirement of this code. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216, or C 652.
- b. The frost line depth may require deeper footings than indicated in Figure R403.1(1)
- c. Wind exposure category shall be determined on a site specific basis in accordance with Section R301.2.1.4.
- d. The ground snow loads to be used in determining the design snow loads for buildings and other structures are given in Minnesota Rules, chapter 1303.

Subp. 3. **Figure R301.2(5)**. IRC Figure R301.2(5), Ground Snow Loads, Pg, for the United States (lb/ft<sup>2</sup>), is deleted in its entirety.

Subp. 4. **Table R301.5**. IRC Table R301.5 is amended to read as follows:

Table R301.5

Minimum Uniformly Distributed Live Loads  
(in pounds per square foot)

Use	Live Load
Attics with limited storage <sup>b,g,h</sup>	20
Attics without storage <sup>b</sup>	10
Decks <sup>e</sup>	40
Exterior balconies	60
Fire escapes	40
Guardrails and handrails <sup>d</sup>	200 <sup>i</sup>
Guardrails in fill components <sup>f</sup>	50 <sup>i</sup>
Passenger vehicle garages <sup>a</sup>	50 <sup>a</sup>
Rooms other than sleeping rooms	40
Sleeping rooms	30
Stairs	40 <sup>c</sup>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm<sup>2</sup>, 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting a 2,000 pound load applied over a 20 square inch area.

b. Attics without storage are those where the maximum clear height between joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high by 2 feet wide, or greater, located within the plane of the truss. For attics without storage, this live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be designed for the uniformly distributed live load or a 300 pound concentrated load acting over an area of four square inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top.

e. See Section R502.2.1 for decks attached to exterior walls.

f. Guard in fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to one square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. For attics with limited storage and constructed with trusses, this live load need be applied only to those portions of the bottom chord where there are two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high or greater by 2 feet wide or greater, located within the plane of the truss. The rectangle shall fit between the top of the bottom chord and the bottom of any other truss member, provided that each of the following criteria is met:

1. The attic area is accessible by a pull down stairway or framed opening in accordance with Section R807.1;
2. The truss has a bottom chord pitch less than 2:12; and
3. Required insulation depth is less than the bottom chord member depth.

The bottom chords of trusses meeting the above criteria for limited storage shall be designed for the greater of the actual imposed dead load or ten pounds per square foot, uniformly distributed over the entire span.

h. Attic spaces served by a fixed stair shall be designed to support the minimum live load specified for sleeping rooms.

i. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.