

## SNOW AND ICE LOADING OF ROOFS

### Know Your Roof

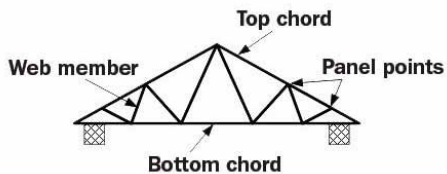
To reduce the risk of roof collapse, know the roof's design capacity. The total weight capacity is based upon the weight of the roof (dead load) and the snow load (live load). Check the blueprints and 'as built' load capacity. A roofer or a structural engineer can also determine permitted loads and add reinforcement if needed.

Design may be compromised by building use and condition. Corroded metal supports, water damage, and storage in roof trusses (if not designed for this use) may reduce potential roof load capacity.

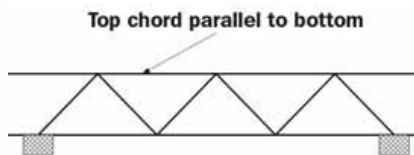


Be alert to lower buildings or roof top equipment that can trap drifting snow. In this photo, the shorter roof may not be designed to support this amount of snow. The owner should explore options for - reinforcing this area of the roof or targeting it for snow removal.

Snow loading is more likely to occur on flat or low slope roofs. Truss roofs may also be more vulnerable to failure. Should one component of the truss break, more weight is supported by undamaged parts, which could lead to overload and collapse. If your building has a wood or metal truss roof, you should be more aware of snow loads.



**Triangular Chord truss**



**Parallel Chord Truss**

Illustrations courtesy of NIOSH

## Get Ready for Winter

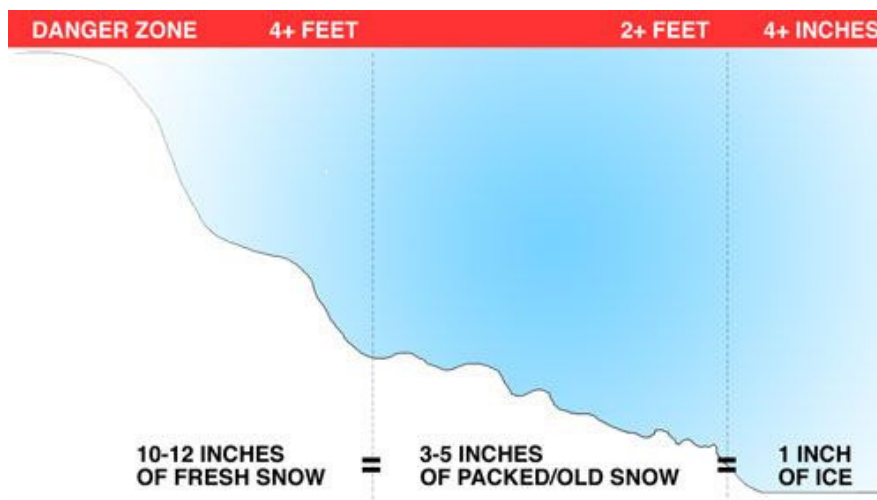
Preparation in the fall can reduce risk by:

- Cleaning debris from drains and rain gutters. Trapped debris may cause ice and snow to build up.
- Inspecting gutter hangers, downspouts and other roof features.
- Reducing ice dam potential. Ice dams form at the edges of roof and may bar melting snow from draining off the roof. Better insulation and proper drainage may reduce this risk. The reference material at [www.disastersafety.org](http://www.disastersafety.org) has more information on preventing ice dams.
- Creating a Snow Removal Plan. Identify what contractors or equipment will be needed. Arrange for this service ahead of winter storms to get priority service. Once buildings start to drop, everyone wants the same roofers to respond. Ensure that selected contractors have proper liability and workers' compensation coverage

## Monitor the Situation

Don't wait until media reports of collapses occur before monitoring your own building.

The following provides a rough estimate of snow or ice depth which may create concern:



Illustration, 'Public Safety Advisory on Potential Roof Collapse', Massachusetts Executive Office of Public Safety and Security

An inch of ice (water) weighs about five pounds per square foot (psf.). Look at the total accumulated weight on your roof. For instance, two feet of packed/old snow and two feet of new snow could weigh up to sixty psf., in excess of some roof designs.

Check weather reports. If the roof already has a significant amount of snow or ice, and a new storm is expected in a few days, reduce the snow load before bad weather hits.

**Important:** If any signs of deflection due to weight of snow are noted, **evacuate the building** and seek professional help to determine structural stability. Signs may include, but not limited to: bowed underside of roof; cracked or bent trusses; and/or popped fasteners.

## Protect Workers and Property

Ideally, a roofer skilled in snow removal should perform this task. Snow removal is best done from the ground, with a snow rake or an aerial lift.



Photo courtesy of OSHA

If workers must go on roofs, fall hazards are a particular concern. Mark skylights or other ‘fall through’ hazards. Workers must wear fall protection if they work near roof edges or on sloped roofs. Identify and stay clear of electrocution hazards such as electrical wires.

Snow removal, if done improperly, can severely damage a roof surface or pop out fasteners. Do not use snow blowers or shovels on roof surfaces; use push brooms or roof rakes instead. Often, depending on roof conditions, weather forecasts and other factors, the roof may not have to be swept clean; some small amount of snow may be left on the roof to melt away unless conditions indicate otherwise. Frequent breaks should be afforded workers to avoid overexertion injuries as a result of clearing large or heavy amounts of snow/ice.

If you have any questions or would like additional information, please contact Donegal Loss Control at 1-800-877-0600 ext. 7126.

## Reference

1. ‘Reducing Roof Risks on Businesses’, Insurance Institute for Business and Home Safety (IIBHS). [www.disastersafety.org/freezing\\_weather/reducing-roof-risks](http://www.disastersafety.org/freezing_weather/reducing-roof-risks)
2. ‘Don’t Let Severe Winter Weather Put Your Business in a Deep Freeze’, IIBHS.
3. ‘Falls and Other Hazards to Workers Removing Snow from Rooftops and Other Elevated Surfaces’, Hazard Alert, Occupational Safety & Health Administration, [www.osha.gov](http://www.osha.gov)
4. ‘Public Safety Advisory on Potential Roof Collapses’, Executive Office of Public Safety, Boston, Massachusetts. [www.mass.gov/eopss/agencies/mema/public-safety-advisory](http://www.mass.gov/eopss/agencies/mema/public-safety-advisory)
5. ‘Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures’, National Institute for Occupational Safety and Health (NIOSH), 2005. [www.cdc.gov/niosh/docs/2005-132/pdfs/2005-132.pdf](http://www.cdc.gov/niosh/docs/2005-132/pdfs/2005-132.pdf)

**IMPORTANT NOTICE** – This Loss Control Technical Guide is provided for informational purposes only and for the benefit of Donegal policyholders and is not intended, and should not be, disseminated for other uses. It is not intended to be complete or definitive in identifying all hazards associated with your business, in preventing workplace accidents, or in complying with any safety-related or other laws or legal requirements. Although the information in this Guide is based on sources which are believed to be reliable, the accuracy and suitability for your specific circumstances are not guaranteed. You are encouraged to apply this information only to the extent that it is applicable to the specific hazards of your business. You should consider having all of your company policies and loss control plans reviewed by legal counsel.