

What **you** can do to **reduce** the possibility of roof collapse?

Roof collapses occur every year, resulting in significant damages to buildings, loss of property, interruption to business, and even serious injuries. Although they can be caused by many factors such as earthquakes, improper design or construction, they occur most frequently during the winter months as snow and ice accumulate on roof surfaces.

Although a collapse may occur on any roof surface, flat roofs are more susceptible to snow and ice accumulation and ice blockages.



How roof collapses occur

Building designs determine how much loading a roof can withstand. The loading capacity can vary greatly from province to province depending on expected snowfalls. Generally stated in pounds per square foot, a roof loading can range from having a snow load of 10 lbs/sq ft up to 70 lbs/sq ft.

Determining the actual weight of snow is also very difficult. 10-12 inches of fresh snow can weigh about 5 lbs/sq ft of roof space. Packed or older snow can have the same weight with only 3-5 inches. Water and ice is even heavier, measuring only about 1 inch for 5lbs/sq ft. Therefore, even 2 ft of packed snow with 2 inches of ice could provide a potentially dangerous snow load.



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Other contributing factors

Added Weight – Additions such as HVAC units, new roof coverings, or equipment hanging from roof steel such as cranes or conveyors can increase the load on the roof.

Projections – Roof equipment, changes in roof elevation, parapets, vents, additions, or even neighbouring buildings may create areas where ice and snow can collect during windy storms. If these projections were added after construction, they may create excess loading on sections while the original design did not account for it.

Clogged drains, gutters & downspouts – On any roof surface, a clogged drain will prevent water from rain or melted snow to leave. Rain that follows snow can be trapped on roofs because drains are still likely frozen. Warm weather will also melt the snow into water.

Ice dams – On sloped roofs, heat radiating from the attic space can melt snow on the roof which will then refreeze by the gutters, completely blocking them off. These ice dams allow snow and water to remain on the roof where it can force itself into the building structure; here it can cause rotted wood, mildew, mould or damaged insulation. Over time, the rotted roofing structure will be weakened, thus decreasing the snow load capacity of the roof.

Age – Newer building codes have more stringent limits set out for roof loading design. Also, over time, roof leaks can rot and compromise structural roofing members which can lead to eventual collapse. Older roof coverings will deteriorate, sealants will shrink, and water leaking will occur.

Warning signs that may indicate a potential roof collapse

- sagging roof steel (plumb bobs or laser levels can be used to measure bowing)
- cracked or split roof members
- sprinkler heads pushed down below ceiling tiles
- doors that pop open or doors and windows that are difficult to open
- bowed utility pipes or electrical conduits at the ceiling
- creaking, cracking, or popping sounds
- severe roof leaks

Steps to prevent roof collapse

- keep drains, gutters, and downspouts clear of ice & debris. The use of heat cables can help to accomplish this.
- ensure downspouts are shortened enough not to freeze at the bottom
- do not shovel or plow snow against downspouts
- repair or replace roof covering before it leaks
- inspect the roof immediately after major storms
- remove snow from the roof (contact a roofing contractor for safe snow removal methods)

How to minimize a loss if you suspect your roof has a problem

- evacuate the building
- remove any mobile equipment
- cover equipment and stock with plastic to protect against water damage
- back-up computers



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