



## TIP #4

# QA &

## HOW MUCH SNOW IS TOO MUCH FOR A ROOF?

That is hard to answer because it's not the depth of the snow but really the weight of the snow that matters.

The short engineering answer is there's too much snow when the design capacity of the roof has been exceeded. However, to the non-engineer who is tasked with maintaining the building, the answer depends on the geographic location of the building, its construction, exposure to its surroundings and whether the number of freeze-thaw cycles experienced during the season has caused ice to form on the building's roof.

In Canada, the structural design of a roof is governed by the loading requirements outlined in the National Building Code or the provincial building code, if one exists.

The minimum roof snow design load set out in the building code is based on snowfall observations converted to a snow load as well as geographic location. Therefore, roof snow load requirements vary from region to region. In the Great-

er Toronto Area (GTA), for example, the ground snow load for downtown Toronto is 18.75 pounds per square foot (psf), whereas it's 25 psf for North York. Further, the building code requires roof structures to be designed to support a rain load as well. For the GTA, this additional load equals 8.3 psf.

The amount of snow that actually accumulates on a roof is dependent on the configuration of the roof (for example, whether it's sloped), its exposure to wind and the number of rooftop obstructions, such as mechanical units, walls and billboards. A tiered roof or one that is enclosed with a high parapet should be designed to support the snow pileup that will accumulate along the base of the tier or parapet, which could be three times as high as that observed on the main field of the roof.

It is generally accepted that snow weighs 19.1 pounds per cubic foot. In the case of the GTA, this translates to a roof snow depth of approximately 12 to 16 inches in

the field of the roof, and increases to 36 to 48 inches along a high parapet or a roof elevation change, depending on the height of the parapet wall/elevation change.

The exception to this is when winter has many freeze-thaw cycles. If the snow on the roof melts but can't drain properly, it can pool and then re-freeze to create ice dams. Since ice has a much greater density than snow, the roof snow load will be greater even if the roof snow depth hasn't been met. When ice damming is suspected, the roof should be monitored carefully to ensure its capacity has not been exceeded. Signs of stress include unusual sounds from the roof or supporting walls, visible movement of the roof structure, sagging of ceiling, cracking of drywall or plaster, and water leaks that show up after a big snowfall.

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