ICE & SNOW ACCUMULATIONS ON ROOFS

At Risk Buildings:
- Unoccupied buildings
- Flat or low-slope roofs
- Accumulation of snow and ice
- Large open floor areas
- Storage, Vehicle parking, Warehouse

Factors Contributing to Collapse:
- Ice dams
- Frozen/clogged roof drains
- Large accumulation of ice & snow
- Structural design issues
- Damage to structural components

For residential, commercial buildings and essential services such as hospitals, the design snow loads can be as high as 50 pounds per square foot. The ground snow load is 70 pounds per square foot.

It should be remembered that the snow load is only a portion of the total design load, which will include wind and dead loads. Dead loads are loads that account for the weight of the roof structure itself. While the total design load may be 2 to 4 times greater than the design snow load alone, the weight of the snow, if it exceeds the design snow load, may cause structural failure.

The weight of accumulated snow/ice, not the depth, is critical in assessing a roof's vulnerability. The water content of snow may range from 3% for very dry snow to 33% for a wet, heavy snow, to nearly 100% for ice. An inch of water depth weighs 5.2 lbs. per square foot. Thus, a roof designed to carry a snow load of 20 lbs. per horizontal square foot is expected to support nearly 12 inches of wet, heavy snow.

Density Information				
	Light/Dry Snow	Heavy/Wet Snow	Ice	Water
Snow Density (lb/cu ft)	3.12	20.81	57.25	62.43
% of water	5%	33%	92%	100%

Snow Load Based on Accumulation Depth			
Snow Depth (feet)	"Dry Snow" (lbs/sq ft)	"In between Snow" (lbs/sq ft)	"Wet Snow" (lbs/sq ft)
1	3	12	21
2	6.5	24	42
3	9.5	36	62
4	12.5	48	83
5	15.5	60	104

Collecting samples of snow/ice is the only practical and accurate way to determine the roof load. The first step is to collect a uniform vertical column of snow from the snow surface to the roof surface. This can be done by thrusting a 3-pound coffee can (6 inches in diameter) repeatedly into the snow until reaching the roof. Empty the snow into a bucket each time the coffee can is filled. After the snow is collected, it is melted and poured back into the coffee can and water depth measured in inches. This depth multiplied by 5.2 provides the snow load in pounds per square foot. For example, if your melted sample measures 4 inches deep, your roof snow load is approximately 21 lbs. per square foot (4 x 5.2 = 20.8).

The other option is to measure a 12" by 12" section from the top of the snow surface to the roof level and measure this column.