

PLANNING FOR SNOW REMOVAL

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With snowfall upon us, it is time to review or develop your snow removal plan. Many businesses have winterization plans for their vehicles, water systems, and other areas throughout the facility. However, many neglect to develop a plan for reducing the risk of a roof collapse caused by excessive snow loads.

According to building code, buildings are designed to accommodate a specific amount of snow load. During periods of heavy snow, drifting snow or snow followed by rain, the snow capacity can exceed the designed load. This can lead to structural deflection and, in extreme cases, roof collapse causing severe damage to property and products, and in some cases injuring people.

Snow removal plans are extremely important for buildings with large spans such as such as warehouses, gymnasiums, retail stores, and shopping centers.

Determine Snow Loads

Determining a building's design snow load may be as easy as reading it off the building plans or talking with the "designer of record." On older buildings, it may require the services of a structural engineer to determine the in-place capacity of the structural elements, and thereby allow interpolation of the original design snow loads. This load can then be used to establish a building's "safe snow load." Depending on the structure and building occupancy, the "safe snow load" could be 50 percent of the roof's actual design snow load. Snow removal would be initiated once the actual snow load exceeds this amount.

Design snow loads are measured in pounds per square foot (psf) and can range from 20 psf to over 70 psf. Fresh snow can range from 10 to 20 pounds per cubic foot. Snow that has partially thawed and then frozen may approach 40 to 60 pounds per cubic foot.

As you can see, determining if a roof is overloaded can be and generally is, part of the problem. Snow sampling procedures can be developed to measure and approximate the actual snow loads. Normally this procedure requires taking several 12"x12" full depth samples of the snow and weighing them. It is important to determine the load by actually weighing the sample of the snow and not merely measuring snow depth.

Due to the differences between fresh and frozen snow, there is no definitive correlation between snow depth and snow density.



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Identify Warning Signs

In addition to exceeding the "safe snow load," other warning signs of overloading may be:

- Large ice dams forming along the perimeter edge.
- Drifting snow build-up at roof height changes and parapet walls.
- Large amounts of snow sliding from one roof section to another lower section.
- Severe roof leaks may indicate a damaged or torn membrane.
- Ripples or bends in metal supports, cracks in wooden members, rolled or bent metal purlins.
- Hearing loud popping noises emanating from the building structure.
- Ponding water in areas where it never accumulated before.
- Observing obvious deformities in the roof.

Develop Your Plan

A snow removal operational plan should be developed just like a roofing specification. The plan should clearly identify who will do what, what procedures will be used in measuring actual snow loads, what type of equipment should be used, and in what sequence the operational plan will be accomplished.

Plans should also consider the need for emergency shoring at vulnerable areas and how all operations will be conducted in a safe manner. Specifically, the plan should address roof access and egress, edge fall protection, and appropriate cold weather clothing. Any time you add snow and ice to the roof, slip and fall accidents, as well as sudden snow slides can result in injury and even death. Be sure whoever is removing the snow on your roof has a plan to mitigate these risks.

In addition, it is critical to know the layout and building framing system. This layout must be available and easily viewed from the roof surface. Prior to the onset of inclement weather, the building column lines, location, and direction of primary framing elements should be marked on the roof. This can usually be accomplished with spray paint on the backside of parapet walls.

Adding insult to injury would be if the roof had to be repaired or replaced because of improperly performed snow removal operations. The following are specific dos and don'ts of the snow removal plan:



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- Do remove snow and ice from drainage devices first.
- Do remove snow in strip patterns, starting at the drainage device and proceeding up slope. Remove snow in strips equal to 1/3 the column spacing width starting at mid-span between columns.
- Do take precautions when removing snow at the base of curbs and walls. All snow and ice does not have to be removed. Damaging flashings to remove that last little bit of snow is not necessary.
- Do use plastic shovels and plastic tubs for lowering the snow to the ground.
- Do protect and barricade areas where snow will be dumped or lowered.
- Do remove drifted and unbalanced snow loads first.
- Don't use snow blowers. Quicker snow removal is generally offset by increased and sometimes permanent roof damage.
- Don't stockpile snow on the roof.
- Don't use picks, hammers, spud bars or other sharp tools to remove ice.
- Don't use hot water pressure washers to remove snow from the field of the roof. This water generally freezes before it exits the roof, adding to building load concerns.
- Don't worry about removing the thin layer of ice from the field of the roof.
- Don't block exit doors or fire exits with snow dumping or stockpiling.

Hire a Contractor

Your snow removal plan can be executed using internal staff or bid out just like a roof maintenance or a typical replacement project. Snow removal contracts are typically a prearranged time and material contract with a roofing contractor and can range from \$0.35 to \$0.75 per square foot.

Summary

The snow will come. Consider incorporating your snow removal plan into your overall facility maintenance program. Having a plan in place prior to the first snow will reduce the risk of product damage, employee injury, and catastrophic roof collapse.