



# Guidance for Protecting Commercial Buildings from Winter Weather

Record snowfalls and costly winter weather-related property damage in many regions of the country are reminders of the need to prepare buildings and business operations before extended periods of freezing weather. As a business owner, there are two areas that need attention before the winter weather sets in: the building itself and day-to-day operations, according to the Insurance Institute for Business & Home Safety (IBHS).

In this document, IBHS engineers identify factors that could help determine how well your building might perform under the weight of heavy snow loads on the roof. IBHS also offers guidance on how to avoid the formation of ice dams and how to prevent frozen pipes. While frozen pipes are the leading cause of property damage due to winter weather, record snowfalls in recent years have resulted in roof collapses on businesses from Arizona to New England. This can lead to significant damage to both the building and the contents and prolong the recovery period after the snow melts. Like frozen pipes, ice dams can result in severe water damage that will put electronics, supplies and other materials and equipment at risk.

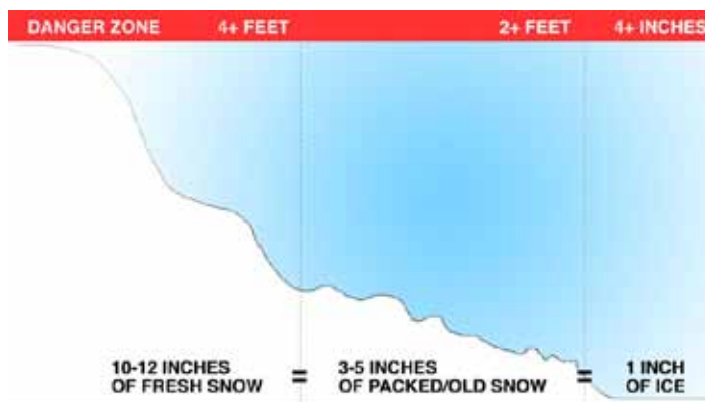
Once you've taken steps to shore up the structural protections in your building, consider the operational perspective of winter weather. It is important to have a business continuity plan that can be put into action if severe winter weather forces you to temporarily close, interrupts the supply chain or leaves your business operating with a limited staff. The IBHS [Open for Business](#)® program is designed to help walk you through the process of planning for the unexpected. A good example of how a business continuity plan can work is a New Hampshire-based hospital supply company that was forced to close its headquarters due to a Nor'easter. Because the owners already had an [Open for Business](#)® plan in place before the snowstorm, they were able to operate out of a home office. This allowed their trucks to continue making deliveries to the local hospital, which kept operations running smoothly since they were the only hospital supplier within 50 miles of the facility.

Another important aspect of winter weather planning for your business is ensuring a consistent power supply. Given the likelihood of lengthy power outages during ice storms, it is important to purchase and [learn how to safely operate and maintain a generator](#) before it's needed. This enables your business to continue serving customers even as some streets in your community are waiting for plows or utility crews.

IBHS offers the following guidance to help small and mid-sized business owners stay [Open for Business](#)® as we prepare to enter the winter season:

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

When it comes to the weight of snow, the type of snow is as important as the depth of snow. Fresh "powder" type snow is typically lighter than wet packed snow. Ice is the heavier than snow. During the winter months, a roof system can be exposed to all three combinations over a several month period.



## IBHS OFFERS THESE GENERAL GUIDELINES TO HELP ESTIMATE THE WEIGHT OF SNOW:

- *Fresh snow:* 10-12 inches of new snow is equal to one inch of water, or about 5 lbs per square foot of roof space.
- *Packed snow generally is heavier than new snow:* 3-5 inches of old snow is equal to one inch of water, again about 5 lbs per square foot of roof space.
- *Ice is also heavier than snow.* One inch equals about a foot of fresh snow.
- *The total amount of accumulated snow and ice is what matters in evaluating snow load risk.* For example, the accumulated

weight of two feet of old snow and two feet of new snow could be as high as 60 lbs per square foot of roof space, which may stress the limits of even the best designed roof.

If you are in the “danger zone” according to chart above or if the loads you estimate based on the thickness of the various types of snow and ice exceed 20-25 psf, you should consider having the snow removed from your roof.

### PREVENTING ROOF COLLAPSE

IBHS has outlined a number of factors that could dictate how your particular facility will perform under the weight of ice and snow. These factors are listed below and link to detailed information on the IBHS website, DisasterSafety.org, which includes engineering considerations that could help you avoid roof collapses this winter.

- [Live and dead load design;](#)
- [Age of the building and the roof;](#)
- [Condition of the roof;](#)
- [Elevation;](#)
- [Maintenance during or after a major snow storm](#)

Roof top equipment and roof projections can cause snow accumulation due to drift, creating the need for higher snow load consideration in these areas.

### ADDRESSING ROOF STRENGTH

If it is determined that the roof system is not adequately designed to withstand the snow falls being encountered, a building owner should consider strengthening the roof as soon as possible or before the next winter. A structural engineer can determine the maximum loads your roof can withstand, as well as provide practical solutions to improve the strength of your roof.

### SNOW REMOVAL

Safe snow removal may reduce some of the snow load on your roof. Consider contracting with a professional for snow removal. If your workers will be removing snow keep the guidelines below in mind. To avoid roof collapse, snow removal should begin prior to reaching the snow load limit of the roof.

Always follow Occupational Safety and Health Association (OSHA) Regulations and Standards, particularly fall protections for roof work. Avoid using shovels or snow blowers. Instead, use a heavy duty push broom with stiff bristles or roof rake to brush off the snow down the slope of the roof. For most single-story buildings with steep sloped roofs, a roof rake may be used for while remaining on the ground to pull snow down the roof slope. Do not pull snow back against the slope or sideways since the snow may get underneath the cover and can break shingles.

If you see indications that the roof is deflecting under the weight of the snow in certain areas, be sure to keep people away from those areas and seek the help of a professional snow removal expert.

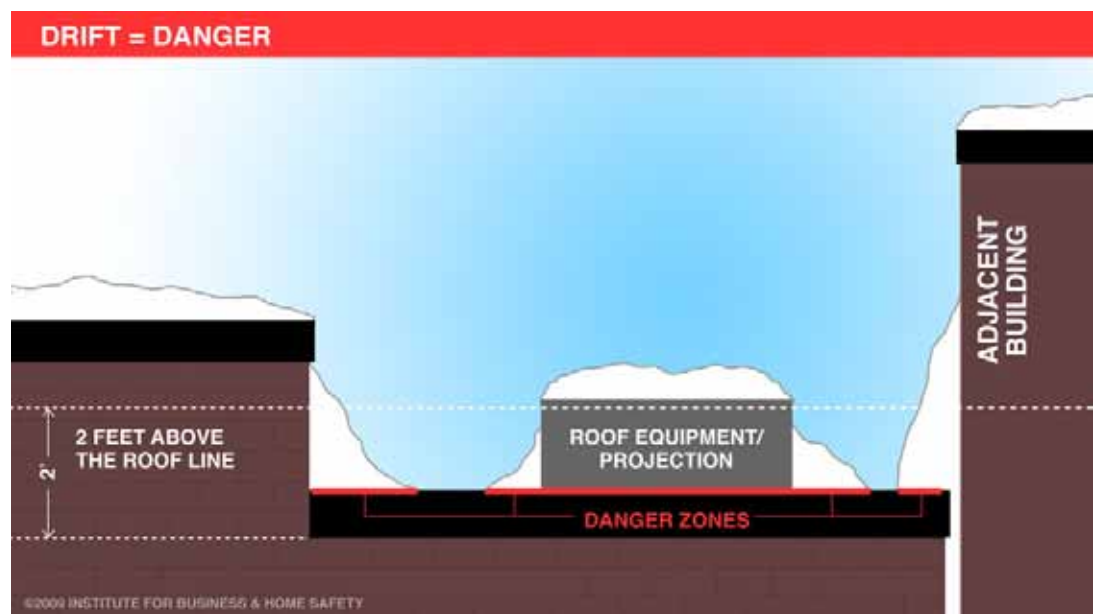
### ICE DAMS

Ice dams are ridges of ice that form at the edge of a roof and prevent melting snow (water) from draining off your roof. The water that backs up behind this “dam” can leak into your business and cause damage to walls, ceilings, insulation, and other areas. Additionally, when the roof doesn’t drain properly, snow, ice, and water remains trapped on the roof, adding loads that put your roof at greater risk.

### PREVENTING ICE DAMS

IBHS offers the following guidance to help prevent damage from ice dams. Find [additional guidance on ice dam prevention](#) from IBHS.

- Increase insulation above ceilings.
- Create a roof preventative maintenance, including periodic roof drainage inspections.
- Install self-regulating heating cables on gutters, downspouts, and around roof drains.
- Keep all drains, scuppers, gutters, and downspouts free of debris and vegetation.
- Prune trees that may hang over the roof to prevent an



accumulation of tree leaves and branches that may clog or slow roof drainage.

- Improve ventilation. Consider installing electric power vents with thermostats.

## REMOVING ICE DAMS

IBHS does not recommend chipping or breaking ice dams because this can damage the roof. The following IBHS guidance is for the most common types of commercial roof systems.

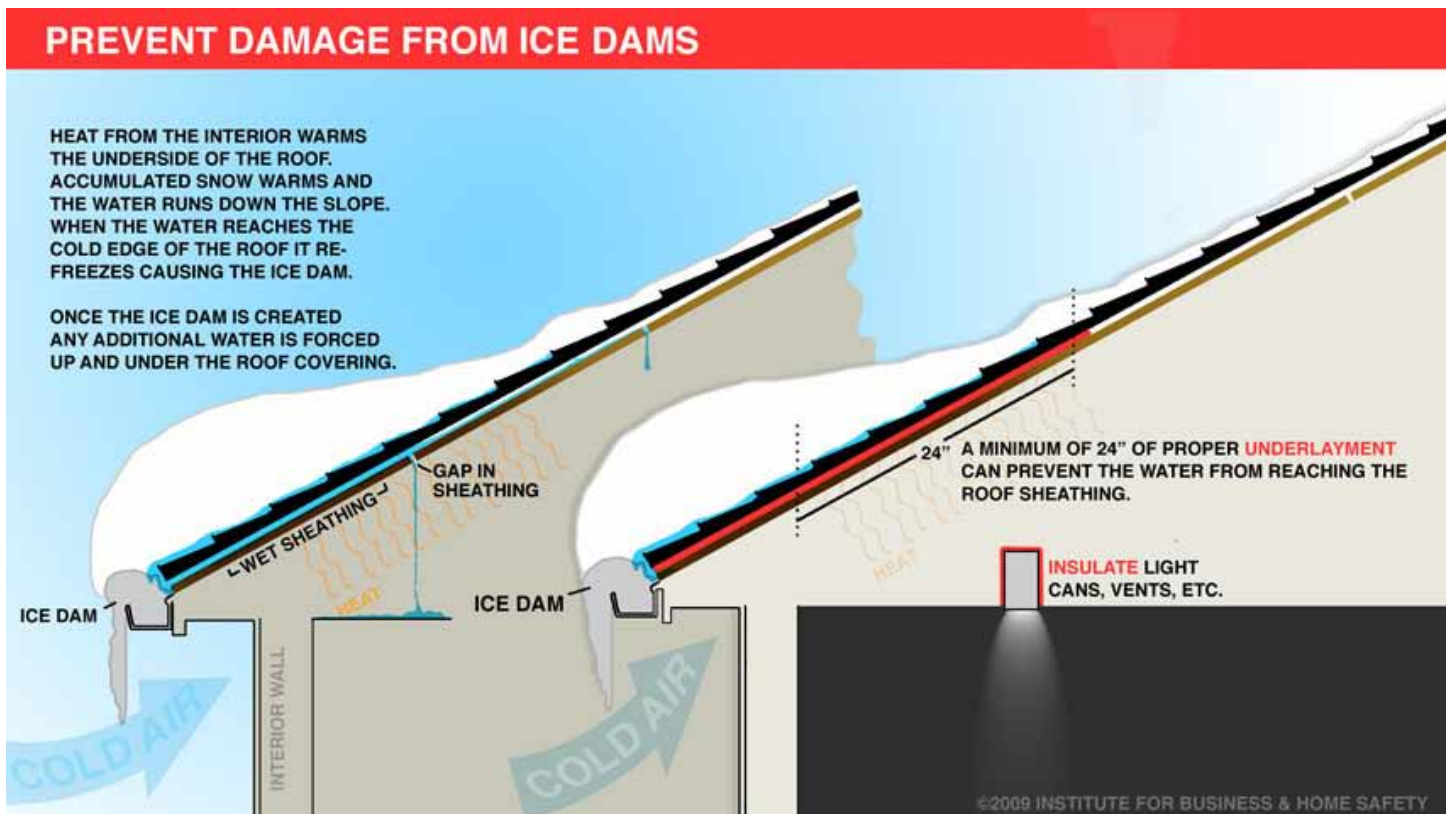
### STEEP SLOPED ROOF SYSTEMS:

- If the building has a history of ice dams, remove the snow to reduce the risk.
- If the building is too tall to reach with a roof rake from the ground, hire a roofing professional. For more information, please see [Selecting a Roofing Professional](#).
- Remove or relocate heat sources that are installed in open areas directly under the roof.
- Increase ventilation in attic spaces:
  - New gable roofs: Soffit/ridge vents provide good ventilation.
  - Gable end vents: place an electric fan over vents to increase the flow of air.
  - Hip roofs: Box or static vents are practical improvements.
- Insulate recessed light fixtures in the ceiling to reduce heat entering the attic. Look for visible light inside the attic. If present, insulate or seal.
- Insulate or seal all attic penetrations: partition walls, vents, plumbing stacks, electric and mechanical chases and access doors.

- New roof installation: Seal the roof deck using at least two layers of underlayment cemented together or a self-adhering polymer modified bitumen sheet. Extend the moisture barrier at least 24 inches from the edge of the eaves to beyond the inside of the exterior wall. [See Sealing the Roof Deck](#).

### FLAT, MONOSLOPE AND LOW SLOPED ROOF SYSTEMS:

- Flat roofs are particularly vulnerable to water leaks if ice dams keep water from flowing into roof drains. Removing the snow will remove the source of a potential ice dam.
- Drains:
  - If ice dams form around drains, place heating cables on the roof and connect the cables to the drains to create a path for the melting ice to follow.
  - Consider installing heating cables in a zigzag manner inside gutters.
  - If there is extensive ice build-up around the drains, consult a roofing professional. [See Selecting a Roofing Professional](#).
- When the roof is dry, inspect the roof cover. Look for mold, mildew and vegetation, all of which are signs of a problem with the slope of the roof cover system and drainage. A roofing professional can advise you about re-pitching the roof cover.



## FROZEN PIPES

Frozen water exerts thousands of pounds of pressure per square inch on a pipe and can burst it, causing flooding and major damage to your business. Extensive water damage can also occur as a result of frozen pipes in sprinkler systems during extended power outages in freezing weather.

### PREVENTING FROZEN PIPES

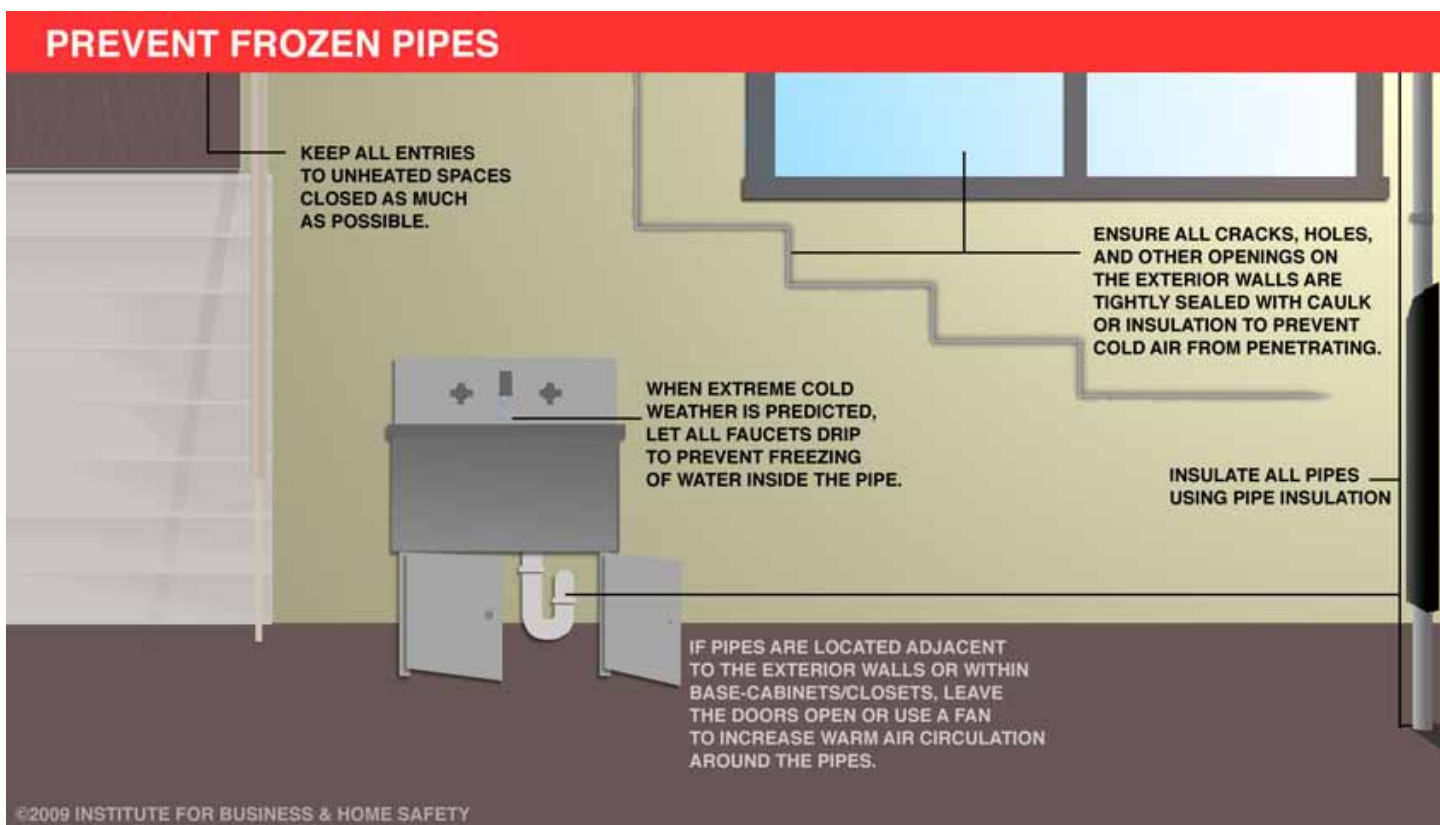
IBHS offers the following guidance for reducing the risk of pipes freezing:

- Provide a reliable back-up power source, such as a stand by generator, to ensure continuous power to the building.
- Install a monitoring system with notifications if the building's temperature dips below a pre-determined number.
- Insulate recessed light fixtures in the ceiling to reduce heat entering the attic. Look for visible light inside the attic. If present, insulate or seal. If the space above a suspended ceiling is conditioned, there is no need for added insulation or sealing.
- Insulate and properly seal attic penetrations such as partition walls, vents, plumbing stacks, electric and mechanical chases, and access doors, and all doors and windows.
- Seal all wall cracks and penetrations including domestic and fire protection lines, electrical conduit and other utility service lines.

- Sprinkler systems should be consistently monitored by a central station to provide early detection of a pipe failure.
- Install insulation and/or heat trace tape connected to a reliable power source on parts of wet sprinkler system piping. This includes main lines coming up from underground passing through a wall as well as sprinkler branch lines.
- UL-approved gas or electric unit heaters can be installed in unheated sprinkler control valve/fire pump rooms. If back up power is provided, the heaters should also be connected to this power source.
- A monitored automatic excess flow switch can be placed on the main incoming domestic water line to provide early detection of a broken pipe or valve when the business is closed.

## PEACE OF MIND

Although it seems as if our winters are longer and colder, the winter weather business protection tips described above can help give you piece of mind during the winter months. IBHS believes that implementing these tips can greatly reduce a building's potential structural loss and loss of business operations due to large snow falls, freezing temperatures and power outages during these times. For more IBHS information on preventing commercial building losses, visit [www.DisasterSafety.org](http://www.DisasterSafety.org).



IBHS is a non-profit applied research and communications organization dedicated to reducing property losses due to natural and man-made disasters by building stronger, more resilient communities.

**Insurance Institute for Business & Home Safety**

4775 East Fowler Ave.

Tampa, FL 33617

(813) 286-3400

[DisasterSafety.org](http://DisasterSafety.org)