

RISK CONTROL CONSULTING

Snow Loading

How Can a Little Snowflake Affect Me?

There are key actions which should be taken before, during, and after a snow event to ensure the safety of occupants and the integrity of structures. If preventative steps are not taken in advance of a snow event, buildings may be vulnerable to structural failure and collapse. The U.S. winter snowstorms of 2011 resulted in numerous building failures in the northeastern part of the country. In response, the Federal Emergency Management Agency (FEMA) prepared a guidance document to inform building stakeholders about the risks a snow event can have on their buildings and how to prepare for said events.



Pre-Season Prevention Measures

To prevent possible problems during the event of a snow storm the integrity of the building structure must be ensured to be in good repair prior to snow season. The following steps must be followed to ensure success:

- Develop a Snow Event Response Plan ahead of the upcoming snow season and annually review your plan to accommodate for each upcoming season and lessons learned from last year's season
- Assign roles in advance to reduce confusion in the event of a snowstorm
- Determine whether snow removal will be done by in-house staff or by contractor on retainer
- Means of roof access and egress should be identified and fall protection shall be reviewed and compliant to OSHA requirements
- Locate and designate areas where snow removed from a roof can be stored on the ground away from entrances, exits, canopies, and building equipment
- Ensure sufficient accessibility for snow removal vehicles
- Ensure that the facility has the proper snow removal equipment available and prepare an inspection schedule for said equipment
- Due to snowfalls ability to hide rooftop hazards, conduits, gas lines, vents, equipment, lightning protection, and skylights should be marked with flags to prevent injury to staff and unnecessary damage to these items
- Ensure that skylights in the roof are guarded by a standard skylight screen or a fixed standard railing on all exposed sides
- To help develop a snow removal sequence, mark the locations of columns and primary structure members
- Make sure that roof drains, gutters, downspouts, and vents are free of debris and other obstructions
- Prioritize and address structural deficiencies identified in the pre-season inspection by severity and risk
- If the design load is not clearly identified in the construction drawings and this information is not readily available, contact a licensed Professional Engineer
- Familiarize yourself with the roof design and areas that require closer observation

Tribal First

888 737 4752 | 18100 Von Karman Ave, 10th Floor | Irvine, CA 92612 | www.tribalfirst.com

RISK CONTROL CONSULTING

What To Do During a Snow Event

- Review the Snow Event Response Plan
- The Plan should outline procedures to determine an approximate snow load and at what point snow removal should be initiated
- Monitor roof deck and framing for warning signs of overstress. FEMA advises that if any of the following warning signs are observed, promptly evacuate the building, and contact a qualified design professional to perform a structural inspection:
 - Sagging ceiling tiles or boards, ceiling boards falling out of the ceiling grid, and/or sagging sprinkler lines and sprinkler heads
 - Sprinkler heads deflecting below suspended ceilings
 - Popping, cracking, and creaking noises
 - Sagging roof members, including metal decking or plywood sheathing
 - Bowing truss bottom chords or web members
 - Doors and/or windows that can no longer be opened or closed
 - Cracked or split wood members
 - Cracks in walls or masonry
 - Severe roof leaks
 - Excessive accumulation of water at non-drainage locations on low slope roofs

What To Do Following a Snow Event

Snow removal is necessary following a snow event if the existing snow load is close to the capacity of the roof structure. If there is if the current snow load is close to reaching capacity and there is an upcoming snow event which will come close to the capacity, snow removal is necessary.

Snow removal should only be performed by qualified individuals. If there is a concern of collapse of the roof structure due to snow load, immediately cease all removal activity and evacuate the building.

Safety Measures for Snow Removal

At a minimum, the following FEMA Guidelines for safe snow removal must be followed:

- Any roof snow removal should be conducted following proper OSHA protocol for work on rooftops. Use roof fall arrest harnesses where applicable
- Always have someone below the roof to keep foot traffic away from locations where falling snow or ice could cause injuries
- Do not drop snow onto egress areas and areas near emergency exits
- Ensure someone confirms that the area below removal site is free of equipment that could be damaged by falling snow or ice
- Whenever snow is being removed from a roof, be careful of dislodged icicles. An icicle falling from a short height can still cause damage or injury
- When using a non-metallic snow rake, be aware that roof snow can slide at any moment. Keep a safe distance away from the eave to remain outside of the sliding range
- Buried skylights pose a high risk to workers on a roof removing snow. Properly mark this hazard as well as other rooftop hazards prior to snow events

Snow Removal Methods

FEMA has outlined the following guidelines for a safe snow removal procedure:

Tribal First

888 737 4752 | 18100 Von Karman Ave, 10th Floor | Irvine, CA 92612 | www.tribalfirst.com

RISK CONTROL CONSULTING

- Removing snow completely from a roof surface can result in serious damage to the roof covering. At least 2 inches of snow should be left on the roof
- Do not use mechanical snow removal equipment as they can damage the roof
- Do not use sharp tools, such as picks, to remove snow
- Use plastic rather than metal shovels
- Remove drifted snow first at building elevation changes, parapets, and around equipment
- Once drifted snow has been removed, start remaining snow removal from the center portion of the roof
- To prevent unbalanced snow loading, remove snow in the direction of primary structural members
- Do not stockpile snow on the roof
- Dispose of removed snow in designated areas on the ground
- Keep snow away from building exits, fire escapes, drain downspouts, ventilation openings, and equipment
- If possible, remove snow starting at the ridge and moving toward the eave for gable and sloped roofs
- If possible, a long-handled non-metallic snow rake can be used from the ground to reduce the risk of employees working on the roof
- The roofing material should be inspected for any signs of damage following any snow removal efforts
- A quick inspection of the structural system will also be necessary after particularly large snow event

Sources

For a more in-depth guide on Snow Load visit **FEMA's Snow Load Safety Guide**. To determine Snow Load building codes, visit the **Snow Load Information by State** site.

Snow Load Information by State:

https://www.fs.fed.us/t-d/snow_load/states.htm

Federal Emergency Management Agency (FEMA) Snow Load Safety Guide:

https://www.fema.gov/media-library-data/7d8c55d1c4f815edf3d7e7d1c120383f/FEMA957_Snowload_508.pdf

FEMA Snow Load Safety Guidance Flyer:

https://www.fema.gov/media-library-data/1392984631969-ac57339deb6ee839a52b16b01eccc53e/FEMA_Snow_Load_508.pdf

This Tribal First Risk Control Consulting fact sheet is not intended to be exhaustive. The discussion and best practices suggested herein should not be regarded as legal advice. Readers should pursue legal counsel or contact their insurance providers to gain more exhaustive advice. For more information on this topic, please contact Tribal First Risk Control Consulting at (888) 737-4752 or riskcontrol@tribalfirst.com

Tribal First

888 737 4752 | 18100 Von Karman Ave, 10th Floor | Irvine, CA 92612 | www.tribalfirst.com