

## Safe Roof Systems – Snow and ice loads

**Know when and where to prevent collapse**

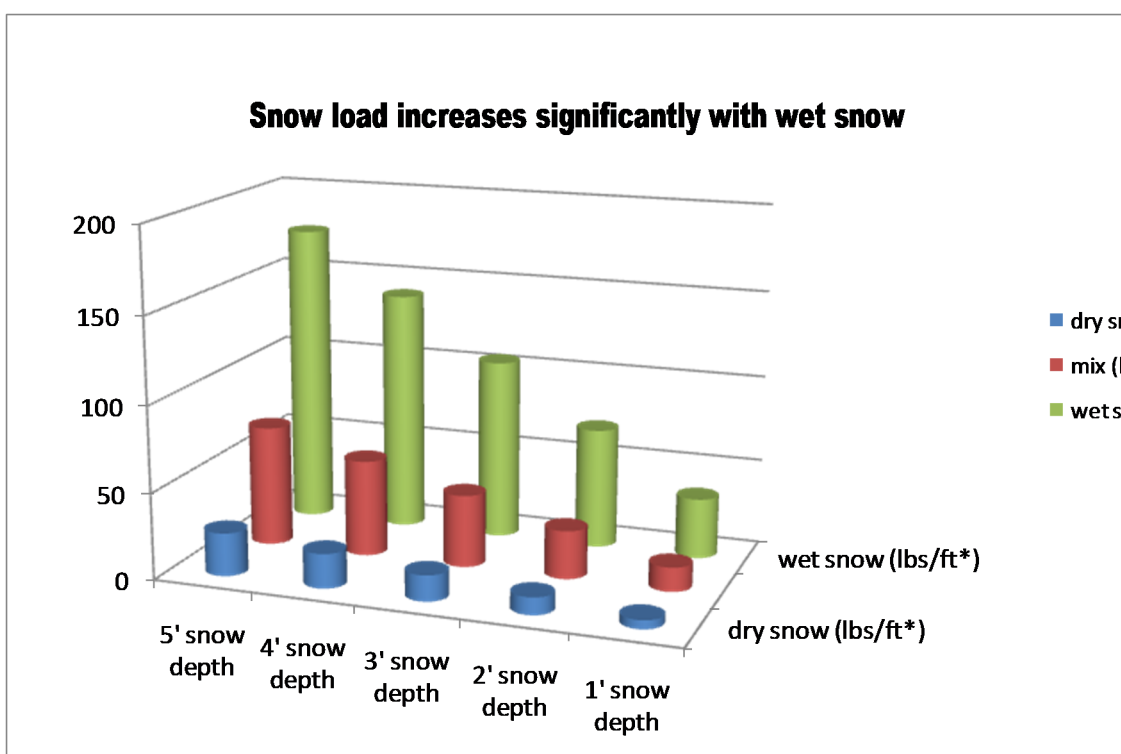


The Safe Roof Systems team has years of experience working with property owners and developing techniques to safely clear over loaded and stressed roof tops. Every building requires it's own plan, but we created this document as a guide for building managers as they prepare their own emergency preparedness plan. Preparing a response plan in advance helps insure that any response is timely and conducted using best and most safe practices and procedures.

Our DMD-1000 Infra Red monitoring system can be an important part of a building management plan. Each system is calibrated at a level of sensitivity tailored to the situation at hand, and provides the ability to alarm facility personnel 24x7x365 of any condition needing to be reviewed or addressed. Well in advance of structural problems, property owners and business operators know that the risky work of removing snow, ice, and ponding loads can be resolved in time – safely - and before excessive stress can cause structural damage or other costs.

### Snow Loads increase with water content

Snow loading can change significantly days after the storm. Roof failures often occur days after the original storm as snow melt collects and centralizes. Water content also impacts the weight. Wet snow weighs significantly more than dry snow.



Many methods for estimating roof loads by measuring snow and ice samples are flawed. The specific weight of snow can range significantly across the entire roof and when a sampling is only taken in a few places, localized roof loads caused by drifting or freezing are often missed. Alternating snow and ice layers can create a roof loading environment that allows for successive layers to build up and not blow or melt away easily. The DMD-1000 monitors the entire roof and will identify a specific zone experiencing excessive deflection and in need of immediate attention.

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## **The Safe Roof Process**

Before any action is taken, facilities personnel must inspect the effected area and determine the likely cause. Sometimes this is quite obvious; such as a major snow storm, or standing water from an extremely heavy rain storm. Other times the reasons are less apparent. In such cases, we recommend a further physical inspection both above and below the roof deck. Contact a structural engineer if the roof is sagging without an apparent contributing load source.

**YOU ARE NOT CLEARING A PARKING LOT.** Roof top snow removal techniques must take into account the structural elements supporting the roof and account for drift walls, parapets, roof drainage, multiple roof/elevation levels, etc. The following guidelines are intended to assist on-site facilities managers when they prepare for Safe Roof Clearing.

**IMPORTANT NOTE:** roof monitoring also protects against accidentally over-loading a roof with construction materials during a scheduled re-surfacing or during a building modification or addition.

## **Safe Roof Snow clearing Procedures**

The following techniques are used by the experienced professionals at Safe Roof Systems and their expert service and installation partners at RCS Group. (It is important to make clear that significant roof work of any kind should only take place after consulting with a structural engineer)

**Once it has been determined that the snow needs to be removed from the roof it is important to inspect the details of the roof support system.**

1. Visually inspect the structure supporting the roof deck.
2. What direction do the roof trusses run? You will want to clear the snow in a cross direction to these supports.
3. Identify location of interior roof drains and determine if they are clear or frozen.
4. Mark the location of structural supports and the center of each bay with spray paint in the snow (this helps workers clear the snow efficiently and safely)

**The work area on the roof and on the ground must be clearly marked.**

1. Rope off the entire work area including a set back from the roof edge
2. Designate and clearly mark access points to roof edge.
3. Drop areas on the ground level secured and access for a front loader marked

**Define jobs clearly.**

1. Roof Team Leader directs activities up top, and Ground Crew Leader directs snow removal on the ground.
2. 2-way radio communication between Roof Team Leader and Ground Crew Leader.
3. Limit the number of people with access to the roof edge and provide each member of this team with a safety harness.

It is important when clearing a roof not to simply shift snow from one location to another, while this does remove the load from one area – piling the snow up (even temporarily) on the roof will dramatically increase the roof stress under the snow pile. It is actually possible to create enough of an imbalance as to collapse the roof from the centralized weight of a temporary snow pile. When clearing a roof, you must always completely remove the snow from the roof as you clear it.

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## Safe Snow Removal

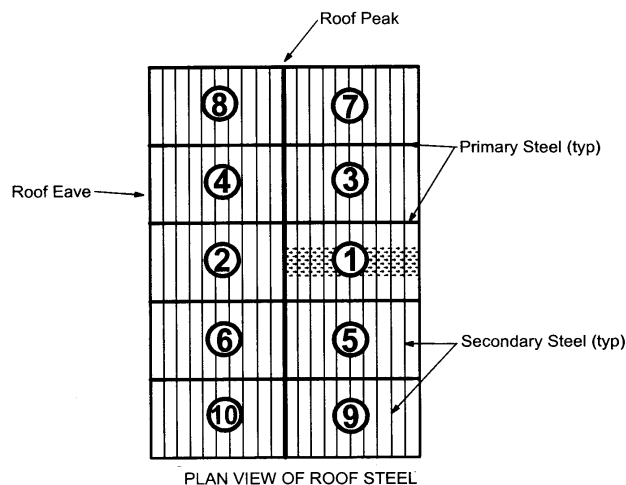
To facilitate this process and to reduce snow weight in a uniform way, your crew needs to start by clearing a set of paths over the entire roof area.

1. If interior drains are clear and running we start by shoveling several radial bands extending outward from the drain to the edge of the roof. This will allow snow melt to quickly drain away while the crew is working. This also helps reduce loads, and allows the work area to drain as snow has a tendency to turn slushy as it is trampled.
2. Clear the snow along the entire drip edge (between 6 to 8 feet)
3. Remove snow from drift walls, sky lights, parapets, or penthouse walls.
4. Clear the center portion of each roof bay from the center ridge all the way to the outer wall (refer to below diagram and listed *snow clearing procedures*)

With the roof divided into sections, snow removed from sky lights and HVAC structures, and any snow drifts removed; the remaining snow can be removed at a uniform rate. The entire Roof Clearing Team can now begin to shovel and clear each section. As earlier mentioned, the best Safe Roof Practices are to clear all these areas at the same time with a crew large enough for the job. Regardless of the crew size however, it is critically important that the Roof Top Team Leader directs the pace of the clearing so the roof loads are reduced at a steady rate across the entire roof surface.

### Snow Removal Procedure

diagram as published in *RiskTopics* Nov. 2004 edition



- 1 Remove snow from center of bay first. Start in between the primary steel and clear a path from the peak to the eave. Clear the entire bay from the center working towards the primary steel.
- 2 Repeat for bay on opposite side of the peak.
- 3 through 10 Repeat the process described in 1 and 2 above until the roof is clear.

### Safe Roof snow clearing procedures

1. Remove snow from the center portion of each bay. Remove the snow completely off the roof as you work.
2. Steadily expand the cleared area by clearing from both sides starting at the center ridge (if any) and move toward the edge.
3. Remember to clear the bay on the opposite side of the ridge before starting another section.
4. Move steadily and clear the adjacent bays, alternating sides until you reach the gable ends.

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## Safe Roof Urgent response procedures

When removing snow from a roof after the DMD-1000 Alarm has been activated.

1. Identify roof sections in alarm by checking the Control Panel for alarm status.
2. Visually inspect the roof structure in the area of the indicated zone(s).
3. Clear the snow from the center of this bay (from ridge out to the eaves)
4. Clear the center of each adjacent bay and the roof areas on the opposite side of a ridgeline
5. Beginning with the roof area that triggered the alarm, clear the zone using the same techniques listed in the previous section.
6. Clear the adjacent areas and continue to clear the remaining roof following the Safe Roof Snow Clearing Procedures.

The DMD-1000 will auto re-set when the roof section returns to its static position – record the time of the original alarm and also when the system auto re-sets. Consult with a structural engineer if your roof system continues to detect roof deflection after the snow, ice, or ponding loads have been mitigated.

any questions regarding your DMD-1000 roof monitoring system should be directed to;  
[info@saferoofsystems.com](mailto:info@saferoofsystems.com) or call 508-758-1500

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