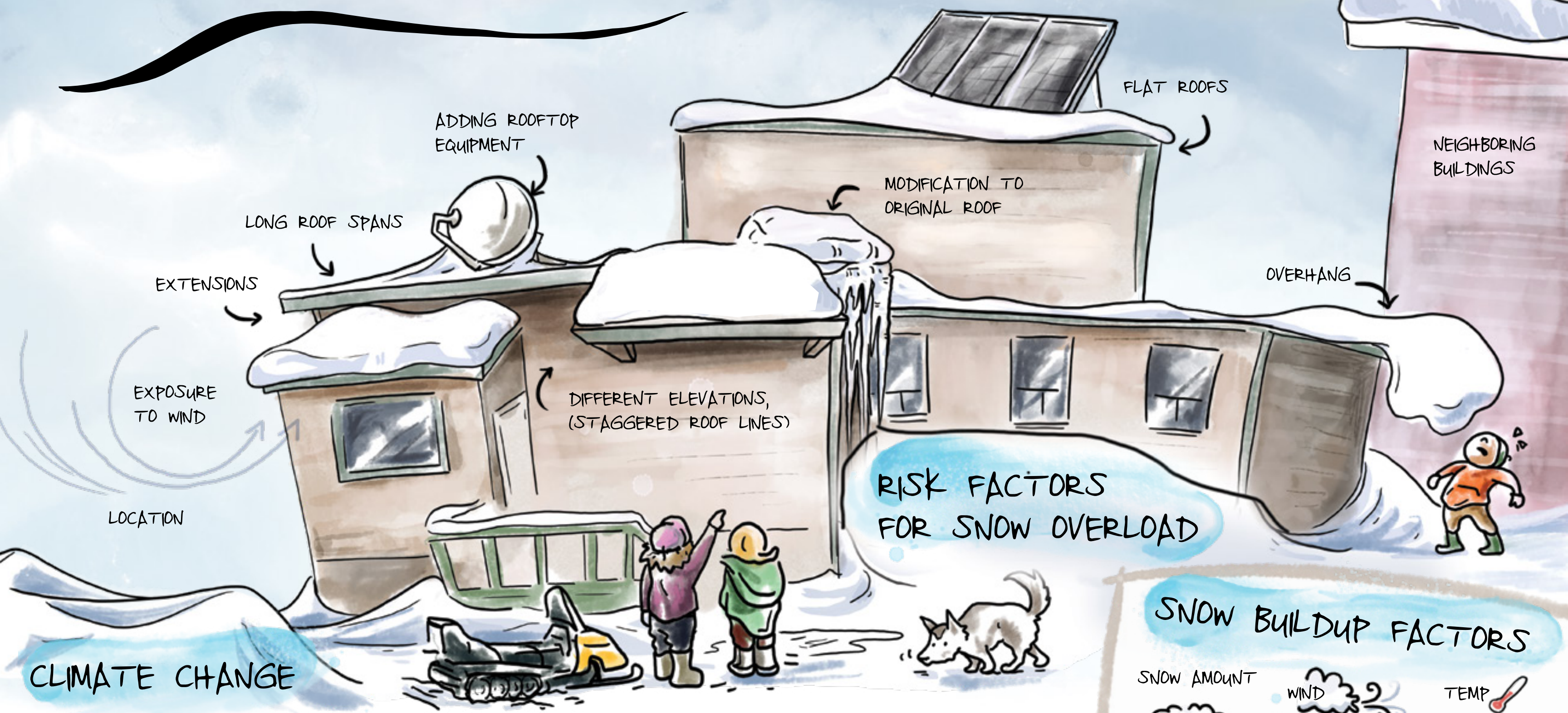
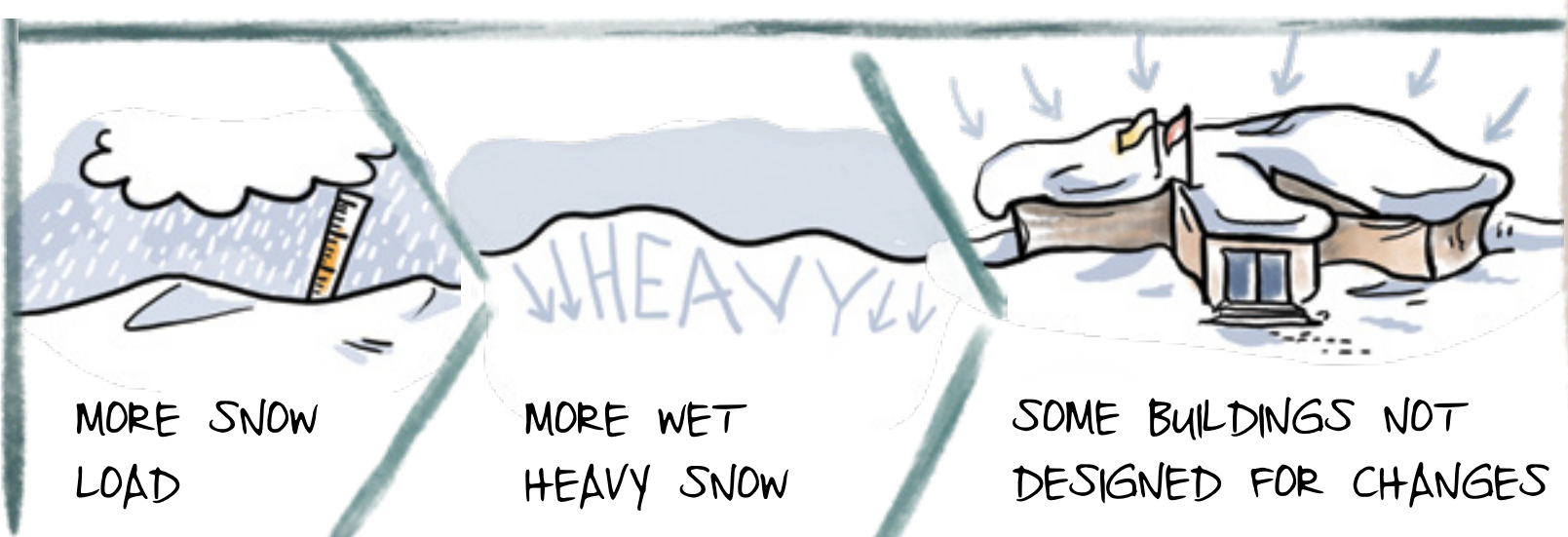
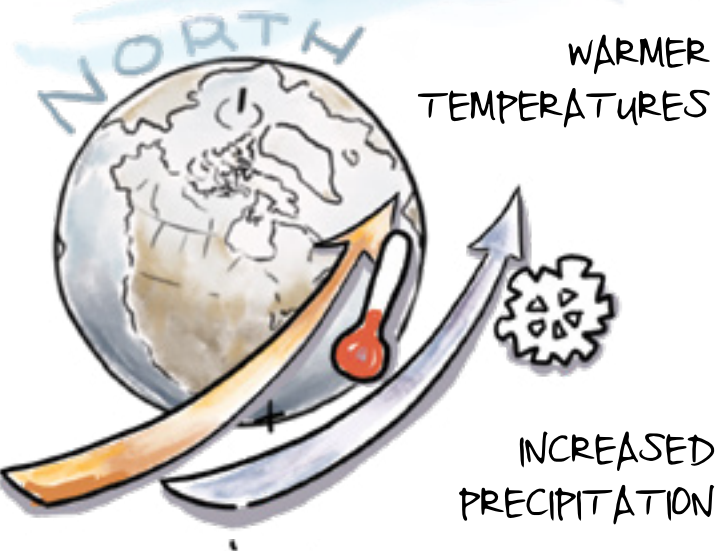


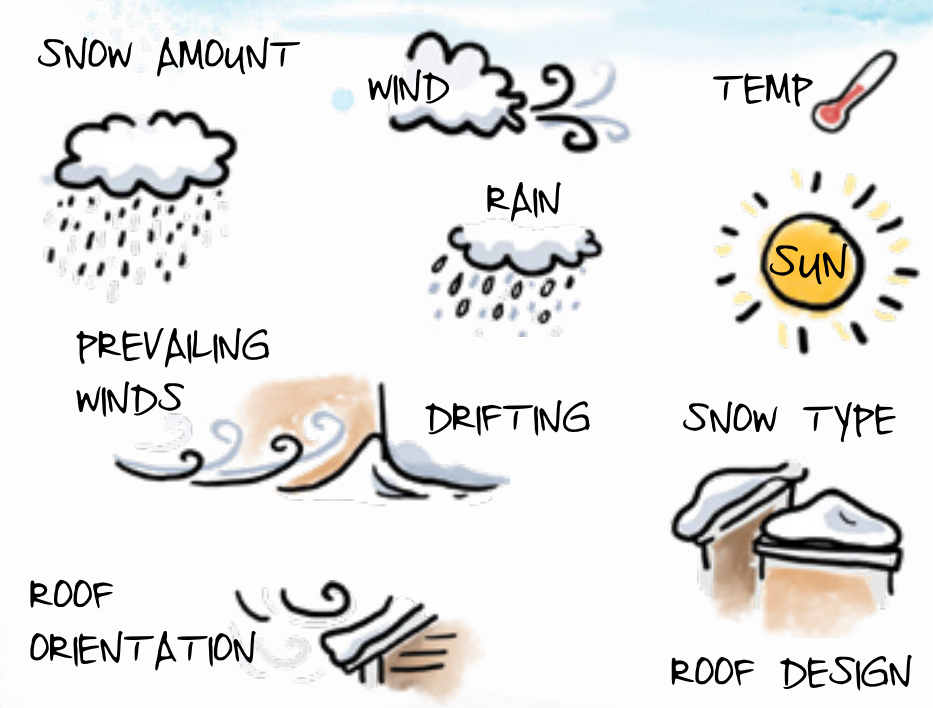
# MANAGING CHANGING SNOW LOADS



## CLIMATE CHANGE



## SNOW BUILDUP FACTORS

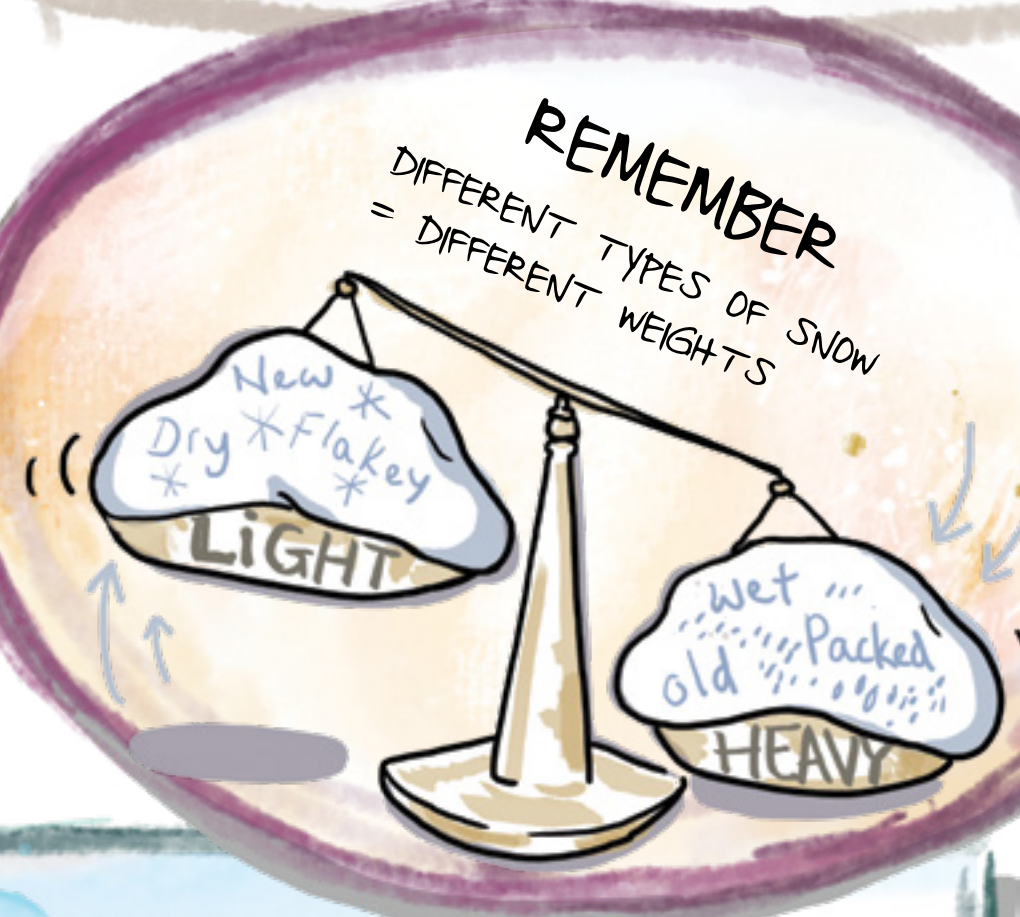


## SUMMER PLANNING

- IDENTIFY AT-RISK BUILDINGS
- ASSESS RISK FACTORS
- PLAN FOR HEAVY SNOW
- DEVELOP SNOW REMOVAL PLAN

## WINTER MAINTENANCE

- LOCAL KNOWLEDGE
- MEASURE SNOW
- UNDERSTAND SNOW
- DOCUMENT
- ASSESS AT-RISK BUILDINGS

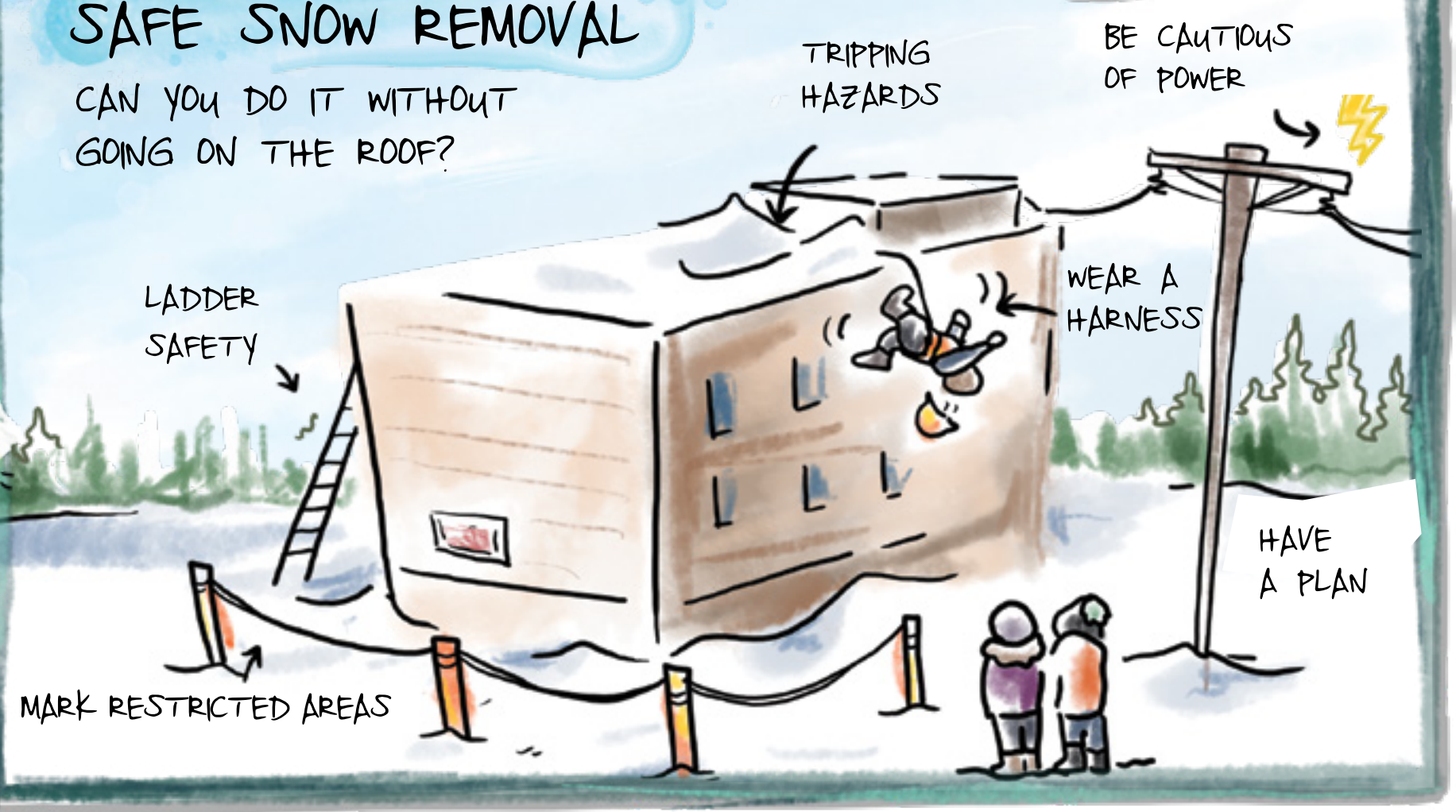


## WARNING SIGNS!



## SAFE SNOW REMOVAL

CAN YOU DO IT WITHOUT GOING ON THE ROOF?





## CHANGING SNOW LOADS

Effects of climate change on northern buildings

### WEATHER PATTERNS ARE CHANGING ACROSS THE NORTH

- \* Different temperatures
- \* More snow and more wet snow
- \* Rain in winter
- \* More freeze/thaw cycles
- \* Changing wind speeds and directions
- \* Increase in extreme weather events

Buildings designed to handle historical snow levels now have to hold up more snow and heavier snow.

### INCREASED SNOW LOADS CAN CAUSE:

- \* Water leaks
- \* Structural concerns including roof collapse
- \* Health risks from slipping hazards and mold
- \* Less access to water and sewer services
- \* Expensive building maintenance/repairs
- \* Increased snow removal costs

We need to adapt to these changes and find ways to effectively deal with snow loads on our buildings.

This is a user-friendly introduction to CAN/CSA S502-14 Managing changing snow load risks for buildings in Canada's North.

Ecology North developed this guide for building owners and maintainers, and community decision makers across the north. Homeowners may also find it useful.

Follow the general principles of this guide together with information contained in the more detailed CSA Standard. Save money, reduce risks, and help northern buildings be safer and last longer.



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Ecology North is a charitable organization, founded in 1971 to support sound environmental decision-making on an individual, community, and regional level.

Contact us or visit our website for information and other guides in this series.

## AT-RISK BUILDINGS



Heavy snowfall affects some buildings more than others

### RISK FACTORS

- \* Building age
- \* Building materials
- \* Exposure to wind
- \* Roof renovations or additions
- \* Water leaks
- \* New buildings next door



Pay attention to snow drifts creating uneven weight on the roof. What is causing the snow build-up?

### WARNING SIGNS

- \* Unusual sounds from the structure
- \* Sagging roofs and ceilings
- \* New/more severe roof leaks
- \* New/sudden cracks
- \* Cracks of drywall or plaster
- \* Bends or ripples in metal supports
- \* Hard to open/close doors or windows
- \* Doors that pop open

Watch for these during periods of heavy snow or melting!



## SNOW REMOVAL PLAN

Be ready to take action when it snows



With a plan, you can monitor at-risk buildings more closely and take action to remove snow when needed.

Update the plan every 5 years, or after any changes to the building.

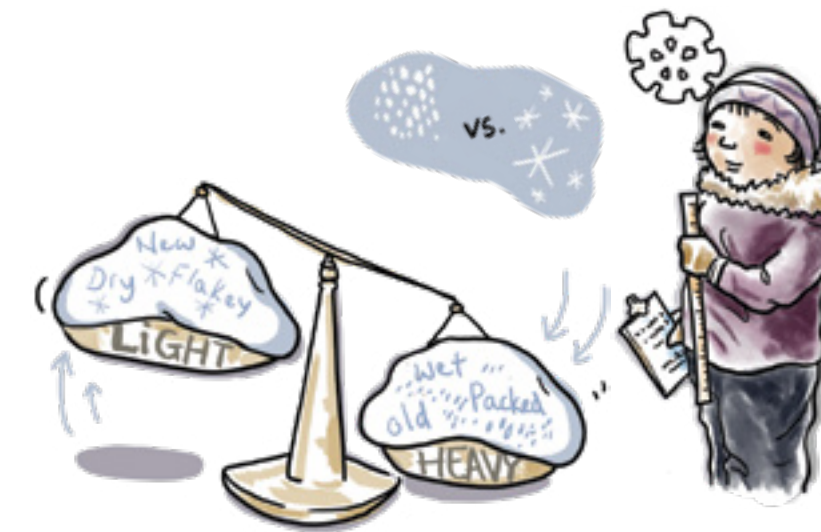
### THE PLAN DESCRIBES

- \* When and how to remove snow safely
- \* Who is responsible
- \* What is the sequence for snow removal
- \* Health, safety, and fall protection concerns
- \* How to reduce future risks

## MEASURING SNOW

Gather data to make good snow removal decisions

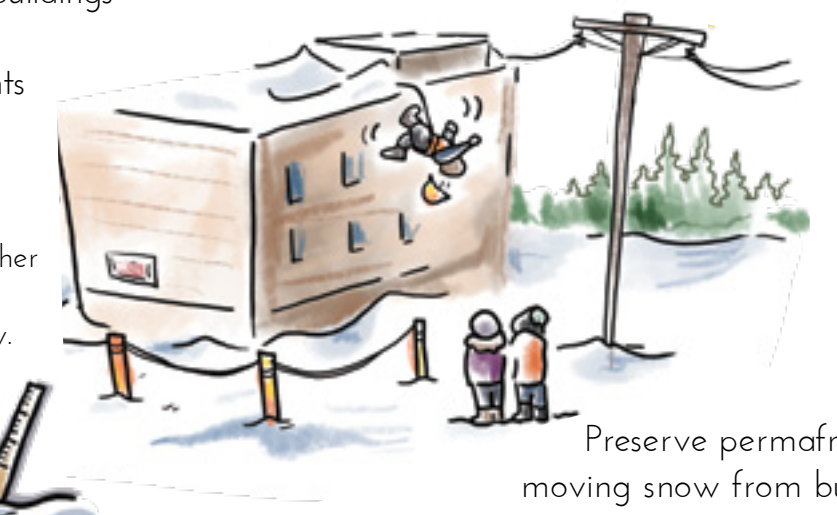
Measure snow throughout the winter and over many years. Keep records.



- 1 Find a flat place away from trees and buildings
- 2 Measure snow depth in three places
- 3 Take the average of your measurements
- 4 Describe the snow: dry, sticky, etc
- 5 Record the date, time, and place

Use what you learn from local knowledge and other sources to understand changing snow conditions. Eg 'wet' snow can be 10x heavier than 'dry' snow.

If you notice an increase in snow, share this knowledge with others in your community.



## SAFE SNOW REMOVAL

If possible, clear snow without going on the roof

### SAFETY PRACTICES

- \* Use fall protection
- \* Remove and mark tripping hazards
- \* Be aware of electrical lines
- \* Pay attention to unusual sounds
- \* Check for signs of roof collapse
- \* Watch out for people on the ground
- \* Have a plan in case of accidents
- \* Remove small amounts of snow at a time

### PRACTICES TO PROTECT THE BUILDING:

- \* Remove snow evenly from across the roof
- \* Do not pile snow in one area of the roof

## SPRING THAW

Manage hazards as winter turns to spring

Put snow guards over entrances, walkways, and windows to reduce falling snow and ice

Watch for ice build-up. As it melts, it can cause icicles, leaks, and permanent building damage.

Watch for slipping hazards where water drips off the roof and freezes.

Use signs and tape to show restricted areas below roof dangers.

Move snow away from the building foundations to allow cold air to recharge the permafrost.

Make sure drainage takes water away from the building. Clean gutters and check downspouts.

## INSPECTING BUILDINGS

In heavy snow years, assess at-risk buildings

### INSPECT AND RECORD THE FOLLOWING

- \* Flashing and roof parapets
- \* Snow and ice build-up
- \* Bends in rooflines
- \* New cracks
- \* Corrosion and signs of stress in metal roofing

Pay particular attention to renovated areas, changes to the roof, and any areas with noticeable snow and ice build-up.

## BUILDING DESIGN

Basic design principles for the changing climate

We usually design new buildings for up to a 50-year lifespan. Think ahead and make decisions with climate change in mind. Good design will reduce risks and future problems.

- \* Keep roof designs simple
- \* Build with major wind directions in mind
- \* Consider other location-specific factors

### UPDATING AN EXISTING BUILDING?

Consider how additions or new equipment (e.g. solar panels, satellite dishes) will affect roof structure and snow drifting. Think about including a roof monitoring system.



## MANAGING CHANGING SNOW LOADS

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