



Engineering Bulletin 035

RE: When Snow Plays Favorites: Why Drift Loads Demand Careful Design

Walk past any building after a heavy winter storm and the snow rarely lies flat. Wind pushes it into deep ridges along walls, sculpts it into towering crests behind rooflines, and piles it against anything that interrupts the airflow: vents, dormers, parapets, neighboring structures. To the casual observer, the roof might still look reasonably uniform. To a structural engineer, those concentrated mounds may turn out to be the loads that govern the design.

For dealers specifying fabric structures and owners planning major facilities, drift loads may be one of the most consequential considerations for a successful project. A roof can be perfectly capable of carrying its specified ground snow load but not have adequate capacity when drift loads are considered.

What Drift Loads Actually Are

Ground snow load and roof snow load describe the weight of snow expected over a broad area. Drift loads describe what happens when wind redistributes that snow into concentrated zones on a roof or against a wall.

Wind picks up snow from open fields, smooth roof surfaces, and upwind areas. When that wind meets an obstruction (*e.g.* a higher adjacent roof, a tree line, an HVAC unit) the airstream slows, separates, and drops its suspended snow. Within hours, a leeward eddy can pile snow several feet deeper than the surrounding roof.

Building codes recognize two primary forms of drift:

- **Leeward drifts** form on the downwind side of a tall obstruction. These are typically the largest drifts and govern most designs near roof-height transitions.
- **Windward drifts** form on the upwind side of a step-up, where snow piles against the rising surface as it scours from the lower roof. These are smaller but still significant.

A third category, **sliding snow**, behaves similarly. Snow shedding from a steep roof onto an adjacent lower roof creates a concentrated band of accumulated material that must be added to whatever drift is already forming there.

Where Drifts Concentrate

Understanding drift mechanics starts with considering the common places where snow drifts concentrate. The same patterns appear across virtually every building type, including fabric structures sited near other facilities.

Roof-to-Roof Height Transitions

Wherever a low roof sits adjacent to a higher one, whether on the same building or a neighboring structure, snow scours off the upper surface and piles against the taller wall. The resulting triangular drift can carry two to four times the design ground snow load at its peak. A fabric warehouse built immediately adjacent to a tall steel grain bin or a multi-story processing building will see substantial leeward drifting along the shared wall.

Parapets and Roof Edges

Parapet walls trap snow on the windward side. While fabric structures typically lack parapets, they often abut buildings that have them, and the drift profile that develops on the upwind face of a parapet can extend several feet onto the adjacent fabric roof.

Rooftop Equipment and Penetrations

HVAC units, exhaust stacks, solar arrays, and other rooftop equipment create localized obstructions. Snow accumulates on the leeward side and around the corners. Passive chimney ridge vents are the most common type of equipment relevant for fabric structures.

Inside Corners and L-Shaped Footprints

Buildings with re-entrant corners create wind eddies that drop snow into the inside angle. Fabric structures arranged in clusters (common in agricultural and industrial yards) can produce drifting between buildings that affects both roofs simultaneously.

Why Drift Loads Govern the Design

A balanced roof snow load might be 25 or 35 pounds per square foot. A drift load in the same project could exceed 80 or 100 psf over a band several feet wide. That concentrated load drives the sizing of trusses, purlins, fasteners, and foundations.

For fabric structures, the considerations are nuanced. A tensioned membrane distributes load to its supporting frame through a different mechanism than a rigid deck. Concentrated drift loads can produce unbalanced tension patterns, accelerate fabric fatigue at attachment points, and impose moments on frames that must be accommodated in the design.

Designing for Drift on Fabric Structures

Properly accounting for drift loads is a routine part of fabric structure engineering, but it requires accurate site information up front. Several factors deserve early attention.

Site context matters more than building type or shape. A fabric structure on an open farm field with no neighbors faces minimal drift risk. The same structure built ten feet from an existing barn or grain elevator faces substantial drift loading along the shared wall. Dealers and owners should document all existing and planned adjacent structures during the quoting process.

Equipment and additions need to be planned early in the design. Adding a rooftop ventilator changes the drift profile. These additions should be specified during design, not retrofitted later.

Frame geometry can mitigate concentration: steeper roof slopes shed snow more readily and reduce drift accumulation. Calhoun's engineering team frequently adjusts truss spacing, purlin selection, and frame profile to handle anticipated drift zones, particularly in salt storage facilities, fertilizer buildings, and equipment shelters where adjacent structures are common.

ASCE 7 in the United States and the NBC in Canada provide the methodology for calculating drift loads, and recent code editions have refined those calculations significantly. The calculation depends on accurate inputs: correct ground snow load, accurate building dimensions, realistic adjacent-structure geometry.

Maintenance plays a role, too. Even a well-designed structure benefits from snow removal protocols in zones identified as high-drift areas. Owners should know where their drifts are likely to form and have a plan for removing accumulation during exceptional storms.

Getting It Right From the Start

Drift loads must be considered to ensure a reliable building design. Drift loads impact the truss sizing, the connection details, the fabric specification, and the foundation design.

Calhoun Super Structure designs and engineers fabric buildings for the full range of applications where drift loads matter: agricultural storage adjacent to grain bins, salt sheds beside rigid warehouses, fertilizer facilities in clustered industrial sites, mining shelters near processing buildings, and equipment storage in regions where snow accumulation occurs. The engineering process begins with site-specific analysis of drift potential, not generic assumptions.

For dealers and owners, the practical takeaway is to share complete site information early. Information such as adjacent structures (either existing or planned), planned equipment such as HVAC or feedstock bins, and intended use is all useful to the designer. The more an engineering team knows up front, the more accurately the structure can be designed for the loads it will actually face.

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