loads, just the eaves themselves. Eave ice dam loads with various return periods on roofs with overhangs of 4 ft or less are presented in O'Rourke et al. (2007).

This provision is intended for short roof overhangs and projections, with a horizontal extent less than 5 ft. In instances where the horizontal extent is greater than 5 ft, the surcharge that accounts for eave ice damming need only extend for a maximum of 5 ft from the eave of the heated structure (see Fig. C7.4).

C7.5 PARTIAL LOADING

In many situations a reduction in snow load on a portion of a roof by wind scour, melting, or snow-removal operations will simply reduce the stresses in the supporting members. However, in some cases a reduction in snow load from an area will induce heavier stresses in the roof structure than occur when the entire roof is loaded. Cantilevered roof joists are a good example; removing half the snow load from the cantilevered portion will increase the bending stress and deflection of the adjacent continuous span. In other situations adverse stress reversals may result.

The intent is not to require consideration of multiple "checkerboard" loadings.

Separate, simplified provisions have been added for continuous beams to provide specific partial loading requirements for that common structural system.

Members that span perpendicular to the ridge in gable roofs with slopes of ½ on 12 or greater are exempt from partial load provisions because the unbalanced load provisions of Section 7.6.1 provide for this situation.

C7.6 UNBALANCED ROOF SNOW LOADS

Unbalanced snow loads may develop on sloped roofs because of sunlight and wind. Winds tend to reduce snow loads on windward portions and increase snow loads on leeward portions. Because it is not possible to define wind direction with assurance, winds from all directions should generally be considered when establishing unbalanced roof loads.

C7.6.1 Unbalanced Snow Loads for Hip and Gable Roofs

The expected shape of a gable roof drift is nominally a triangle located close to the ridgeline. Recent research suggests that the size of this nominally triangular gable roof drift is comparable to a leeward roof step drift with the same fetch. For certain simple structural systems, for example, wood or light gage roof rafter systems with either a ridge board or a supporting ridge beam, with small eave to ridge distances, the drift is represented by a uniform load of $I_s \times p_g$ from eave to ridge. For all other gable roofs, the drift is represented by a rectangular distribution located adjacent to the ridge. The location of the centroid for the rectangular distribution is identical to that for the expected triangular distribution. The intensity is the average of that for the expected triangular distribution.

The design snow load on the windward side for the unbalanced case, $0.3p_s$, is based upon case histories presented in Taylor (1979) and O'Rourke and Auren (1997) and discussed in Tobiasson (1999). The lower limit of $\theta = 2.38°$ is intended to exclude low slope roofs, such as membrane roofs, on which significant unbalanced loads have not been observed. The upper bound of $\theta > 7$ on 12 (30.2°) is intended to exclude high slope roofs on which significant unbalanced loads have not been observed. That is, although an upper bound for the angle of repose for fresh-fallen snow is about 70° as given in Fig. 7-2, the upper bound for the angle of repose of drifted snow is about 30°.

As noted above, observed gable roof drifts are nominally triangular in shape. The surcharge is essentially zero at the ridge and the top surface of the surcharge is nominally horizontal. As such, an upper bound for an actual surcharge atop the sloped roof snow load, p_s, would be a triangular distribution - zero at the ridge and a height at the eave equal to the elevation difference between the eave and the ridge.

C7.6.2 Unbalanced Snow Loads for Curved Roofs

The method of determining roof slope is the same as in the 1995 edition of this standard. C_s is based on the actual slope, not an equivalent slope. These provisions do not apply to roofs that are concave upward. For such roofs, see Section C7.13.

C7.6.3 Unbalanced Snow Loads for Multiple Folded Plate, Sawtooth, and Barrel Vault Roofs

A minimum slope of 3/8 in./ft (1.79°) has been established to preclude the need to determine unbalanced loads for most internally drained, membrane roofs that slope to internal drains. Case studies indicate that significant unbalanced loads can occur when the slope of multiple gable roofs is as low as 1/2 in./ft (2.38°).