



Snow Loads for Design of Single Family Residences

Building Division Interpretations and Procedures

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Section:	IRC Table R301.2 (1) & IBC 1608

Issue

The design roof snow load for single family residences in low-lying areas of the Puget Sound is typically a minimum uniform roof snow load of 25 psf, consistent with the *SEAW Snow Load Analysis for Washington, 2nd edition, 1995* and the *WABO/SEAW Liaison Committee White Paper 8-2010*. 'Low-lying areas' are defined as those areas not exceeding 700' in elevation above sea level.

Interpretation

The City of Bellevue Development Services Department, Building Division, is now enforcing higher design roof snow loads for single family structures at elevations at or above 700' above sea level. **This change is effective immediately.** Design roof snow loads for structures below 700' above sea level will remain at a uniform load of 25 psf and the effects of snow drift and sliding snow need not be considered unless otherwise required for unusual roof geometries. For structures at or above elevations 700' above sea level, engineered design shall be provided in accordance with *SEAW Snow Load Analysis for Washington* and the *WABO/SEAW Liaison Committee White Paper 8-2010*. Reference the table below for additional information & requirements.

Table 1: Snow Loads for the Design of Single Family Residences (Bellevue, WA)

Elevation Above Sea Level	Elevation Above Sea Level	Ground Snow Load (P_g)	Roof Snow Load (P_f)	Drift & Sliding Considered	Rain-on-Snow Surcharge Load- Add 5 PSF	20% of Roof Snow Load Included in Seismic
< 700'	Option 1	N/A	25 PSF	No	Yes for roof slopes $\leq 1/4"$ in 12" <u>QR</u> as determined by ASCE 7-10 Section 7.10	No
< 700'	Option 2	20 PSF	Derived from ground snow load.	Yes	Yes for roof slopes $\leq 1/4"$ in 12" <u>QR</u> as determined by ASCE 7-10 Section 7.10	No
$\geq 700'$	$\geq 700'$	Per IBC/ASCE 7	Derived from ground snow load.	Yes, unless proven otherwise by the design engineer	Not Required	Yes, for roof snow load > 30 PSF. Reference ASCE 7-10 Section 12.7.2(4).

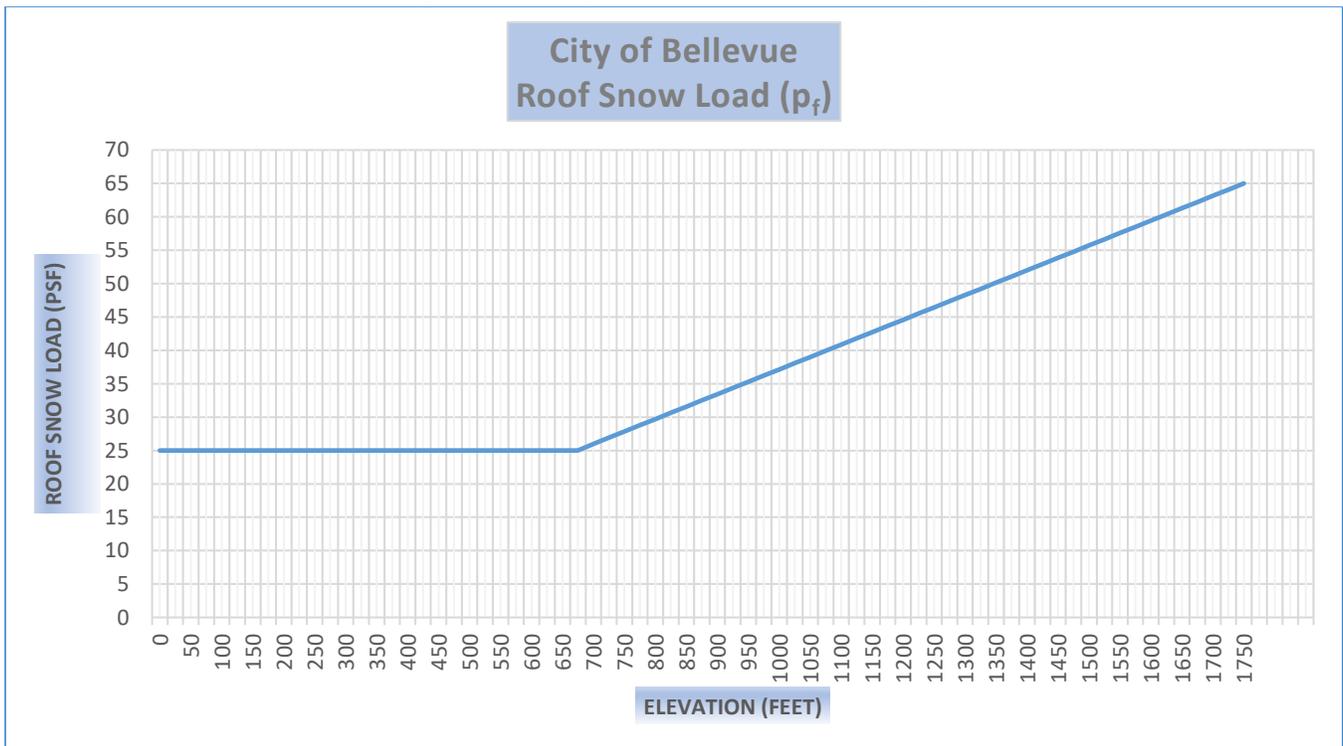
**Snow Load Graph for Single Family Residential Design
(Based on Elevation within the City of Bellevue)**

The intent of this graph is to provide a simplified method for determining design roof snow loads for single family residential structures within the City of Bellevue. Although isoline values vary across Bellevue, a 'worst-case' isoline was established for simplification (isoline = 0.053; isoline variation across Bellevue is within 6%). The user is required to verify that the assumptions used in the simplification are applicable to the specifics of their project.

Use

1. Verify that the stated assumptions of this document are applicable. Reference ASCE 7-10.
 - a. Terrain Category B, Partially Exposed (Table 7-2)
 - b. Heated Structure (Table 7-3)
 - c. Risk Category II (Table 1.5-1)
2. Determine the ground elevation for the project under consideration (numerous programs can be found online to assist with this).
3. Use the graph to determine the roof snow load (P_f). If conditions are different from those stated in the assumptions, adjust the snow load accordingly.
4. **Drifting** and **sliding** are required to be considered at elevations at or above 700'. (ASCE 7-10 Section 7.7 & 7.9)
5. A **rain-on-snow surcharge** is required to be considered for low-slope roofs where the structure is below 700' above sea level. Reference Table 1.
6. ASCE 7-10 Section 12.7.2 requires 20% of the uniform roof snow load to be considered in the **effective seismic weight**, W , when the flat roof snow load, p_f , exceeds 30 psf (regardless of actual roof slopes).

Figure 1: Simplified Snow Load Graph



References and Resources

1. 2015 IRC & 2015 IBC as adopted and amended by WA State and the City of Bellevue
2. ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
3. *SEAW Snow Load Analysis for Washington*, 2nd edition
4. *White Paper 8-2010* – “Guidelines for determining snow loads in Washington State”; December 9, 2010; WABO/SEAW Liaison Committee
5. King County Ground Snow Load Analysis
https://aqua.kingcounty.gov/gis/web/VMC/environment/s_y_20010711_new_snow.pdf

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Attachments **Supersedes:** IBC-06-001