

A frost protected shallow foundation (FPSF) is a practical alternative to deeper, more-costly foundations in cold regions with seasonal ground freezing and the potential for frost heave. An FPSF incorporates strategically placed insulation to raise the frost depth around a building, which allows for foundation depths as shallow as 16 inches even in the most severe climates (see Figure 1). This method has been used extensively in Nordic countries, where over one million FPSF homes have been constructed successfully over the last 40 years. Scandinavia considers FPSF a standard practice for residential buildings.

The Air-Freezing Index (AFI) is a common metric for determining the freezing severity of the winter season. AFI values represent the seasonal magnitude and duration of below-freezing air and can be used to estimate the maximum depth of frost penetration, which is useful for determining the depth of shallow foundation construction.

An accurate estimate of maximum soil frost depth is one important factor in construction costs and building foundations. AFI data and maps have been calculated using temperature data from the 1951–1980 and 1981–2010 Climate Normals.

Cautionary Note When Using AFI Values: *Topographic variability, proximity to bodies of water, and urban heat effects should be considered when using these data. For those locations or if the planned construction site is not located nearby a station that has AFI data, using a combination of the AFI map and the most representative city(s) AFI value(s) is advisable.*

Figure 1: Standard Foundation compared to Frost Protected Shallow Foundation

"Frost Protected Shallow Foundations." National Centers for Environmental Information (NCEI), 17 Jan. 2023, www.ncei.noaa.gov/products/land-based-station/frost-protected-shallow-foundations.

