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MORE ABOUT FROST AND HEAVING SOIL

It's not the Freeze, it's the HEAVE!

Soils around the country will freeze to varying depths during the winter months, but they may not cause any harm to foundations if they don't also heave. Frost heave will only occur where and when the right conditions are in place – fine grain soils such as silts, a high water table, and just the right rate of temperature drop. Most soils in colder climates are categorized as having either low or moderate risk of heave, and the Diamond Pier™ is designed for these areas. The Pins work like an anchor to hold down the concrete head in heaving soils, and as long as there is enough Pin length to counteract these upward forces, the soils will move up and past the fixed pier. The DP-50 will resist this type of soil movement for up to an inch (1") of vertical heave. This is about the maximum level of heave in low and most moderate risk soils throughout the northern US.

Where *severe* heave is well known - in parts of New Hampshire, Vermont and Alaska for instance – all types of foundations are at risk for displacement; even the deep straight cylinder style piers, and especially those used for deck foundations, which support relatively light structures above – further reducing their ability to counteract heave.

In these severe heave conditions the larger DP-100 pier may be the best pier choice for providing the proper heave protection. It has larger, longer Pins and a heavier dead weight than the DP-50 pier. In certain conditions, either pier may also be installed with a coarse sand or pea gravel backfill to enhance the soil movement around the concrete head during the heaving season.

Soils can also heave in warm climates – due to the expansive swelling of clays. As with freezing soils, not all clays are subject to heave or swell, and those that are, may only heave near the surface, while others experience “deep swell”. Clays that do not typically heave at all, or heave only a small amount, are called *lean clays*, and they dominate the northern Midwest. Where more plastic clays are abundant – Colorado and Texas for instance - the soil will swell (and shrink again) according to wet and dry periods.

The Diamond Pier™ is designed to work in lean and low to moderate swelling clays. Again, the Pins provide anchoring resistance for the concrete head, and as long as there is enough Pin length to counteract the upward forces, heaving soil is forced to cleave past the pointed base of the fixed pier. The key is to have more of the Pin length below the heaving layer of soil than above it. This upper heaving soil layer is also known as the saturation zone – its heave is caused by infiltrating rainfall or irrigation – and it's typically only a foot or two down from the surface.

Deep swelling clays however, like severe frost heave, can be a problem for all types of foundations. They are generally the result of the movement of deep sub-surface waters, often caused by man-made excavations and/or off-seasonal irrigation, which can cause otherwise dormant deep clays to expand. One of the benefits of the Diamond Pier™ is that its low impact installation avoids the kind of excavation in these unique soils that can often lead to deep swell problems. However if deep swell already exists, even deeper large-scale vertical piling may be the only foundation option to consider.