Alternate Non-constrained Footing Minimum Depth Formula per EP486.1

EP486.1 §6.5.1 Minimum depth formula for non-constrained posts:

A more detailed review of EP486.1 is linked at the bottom of the Footing Design page for installation sites that have soils reports available.

$$d = \sqrt{\frac{6V_a + \frac{8M_a}{d}}{Sb}}$$

Variables changed to match the FenceDesign.com nomenclature:

Shear, V_a = P Moment, M_a = P ½ h

Solve iteratively. Footing Depth, D ≥ Minium Depth, d is OK

$$d = \sqrt{\frac{6P + \frac{8P\frac{1}{2}h}{D}}{SMb}}$$

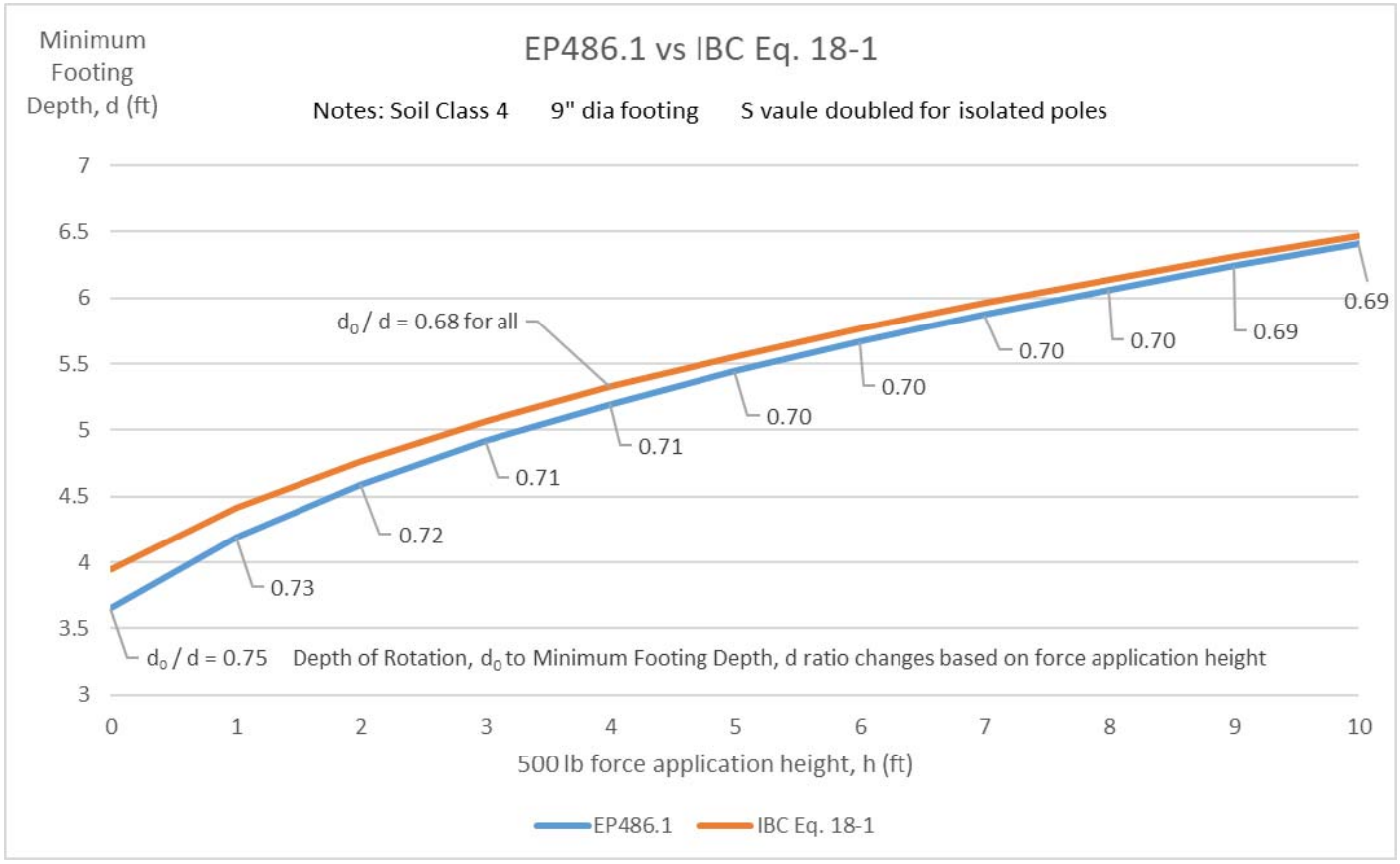
EP486.1 will match IBC Eq. 18-1 for taller poles, but at typical fence heights it provides slightly shallower footing depths, but with fewer calculations steps.

IBC – Three steps each iteration

Calculate S_1	Conservatively uses $d_0 / d = ⅔$
Calculate A	Conservatively uses $d_0 / d = 0.68$
Calculate d	Conservatively uses $d_0 / d = 0.68$

EP486.1 – One step each iteration

Calculate d	d_0 / d value changes with force application height



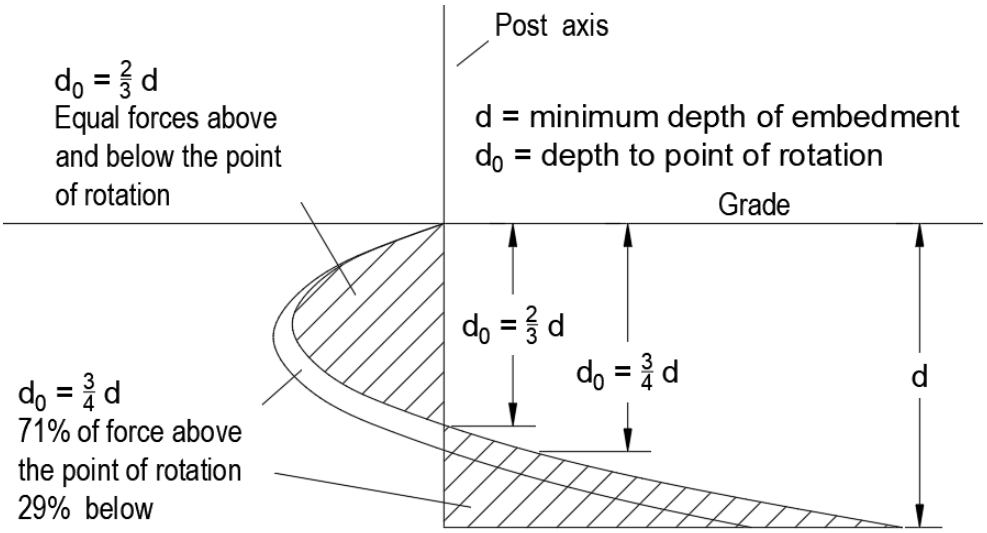
Alternate Non-constrained Footing Minimum Depth Formula per EP486.1 (cont.)

EP486.1 separates the shear caused by the lateral force at grade from the moment induced in the post due to the moment arm from grade to the force application height. This changes the shape of the soil pressure curve based on the force application height.

A flag pole with most of the force at the top of the pole approaches $d_0 = \frac{2}{3}d$

A parking bollard with the force applied close to the ground approaches $d_0 = \frac{3}{4}d$

Fence post footings typically have a d_0 / d ratio from 0.70 to 0.72



Free Body Diagram