EXAMPLE for Axial Capacity of a Drilled Pier:

Drilled pier Capacity in CLAY

Vertical Capacity: Friction in stiff clay profile

$Q_u = \pi DH(K_o * \sigma_{ave} * \tan\phi + \text{Cohesion})$

$Q_u = 3.1416\,DH\left(0.6 * \frac{0.117H}{2} \times 0.51 + 1.25\right)$

$Q_u = 0.056\,DH^2 + 3.927\,DH$

F.S. = 2.0

$Q_{all} = 0.028\,DH^2 + 1.964\,DH$, D = DiA, H = Embed, Qall in Kips (k)

for any D & H Combination.

DiAM.	EMBED,	Vert. uplift	Lateral	vert. sett	Latrl Defl.
2.0 ft	30 ft	168.2 k	84.0 k	30.5 k	0.5" 0.30"
2.0 ft	32 ft	183.0 k	91.5 k	31.0 k	
2.0 ft	34 ft	198.3 k	99.2 k	30.0 k	

* To be independtly approved by the project Structural engineer.

Mat. Loadings Given to us: vert = 185 k, Lateral = 20 k. Spacing 5.0' o.c.

pier DiA = 2.0 ft.

If it is Sandy, assign Cohesion =0

By keeping the D & H terms (diameter & embedment), you let the structural pick off his optimal geometry. You will need to do additional analysis for lateral load capacity.