

Units: $k := \text{lb} \cdot 1000$

$\text{klf} := k \cdot \text{ft}^{-1}$ $\text{plf} := \text{lb} \cdot \text{ft}^{-1}$ $\text{kst} := k \cdot \text{ft}^{-2}$ $\text{psf} := \text{lb} \cdot \text{ft}^{-2}$

$\text{kcf} := k \cdot \text{ft}^{-3}$ $\text{pcf} := \text{lb} \cdot \text{ft}^{-3}$ $\text{ksi} := k \cdot \text{in}^{-2}$ $\text{psi} := \text{lb} \cdot \text{in}^{-2}$

$\text{make_if}(a, b, c, d) := \begin{cases} c & \text{if } a < b \\ d & \text{otherwise} \end{cases}$

$i := 0..1$

FOUNDATIONS

Soil Class **SC := 3** [2, 3, or 4]

SGA - pier at spacing = L = 0.3 gal

$d_i := 1 \text{ in}$

| | |
|----------|-------------------|
| $h_i :=$ | $\text{Phs}_3 :=$ |
| 15.1ft | 290lb |
| 7.3ft | 444lb |

Given

Shear - procedure per IBC 1807.3, nonconstrained

b := 16 in pier diameter

$q := 2 \cdot \text{if}(\text{SC} = 5, 100 \text{ pcf}, \text{if}(\text{SC} = 4, 150 \text{ pcf}, \text{if}(\text{SC} = 3, 200 \text{ pcf}, 400 \text{ pcf}))) = 400.0 \text{ pcf}$

$S_{11}(d_i) := q \cdot 0.33 \cdot d_i$ $S_1(d_i) := \overrightarrow{\text{make_if}(S_{11}(d_i), 15 \text{ ft} \cdot q, S_{11}(d_i), 15 \text{ ft} \cdot q)}$ Table 1806.2

$S_{11}(d_i) = 11.0 \text{ psf}$ $S_1(d_i) = 11.0 \text{ psf}$

$P := \text{Phs}_3 = \begin{pmatrix} 290.0 \\ 444.0 \end{pmatrix} \text{ lb}$ $A(d_i) := \frac{2.3 \cdot P}{S_1(d_i) \cdot b}$ $A(d_i) = \begin{pmatrix} 46.3 \\ 70.8 \end{pmatrix} \text{ ft}$

$d(d_i) := \left[\frac{A(d_i)}{2} \cdot \left(1 + \sqrt{1 + \frac{4.36 \cdot h}{A(d_i)}} \right) \right]$ $d(d_i) = \begin{pmatrix} 59.1 \\ 78.1 \end{pmatrix} \text{ ft}$

$1.0 = \frac{d_i}{d(d_i)_0}$ $d_i := \text{Find}(d_i) = 51.7 \text{ in}$

$1.0 = \frac{d_i}{d(d_i)_1}$ $d_i := \text{Find}(d_i) = 49.8 \text{ in}$

$1.0 = \frac{d_i}{d(d_i)}$ $d_i := \text{Find}(d_i) = 49.8 \text{ in}$

I would like to get both of these values stored in a single vector here.