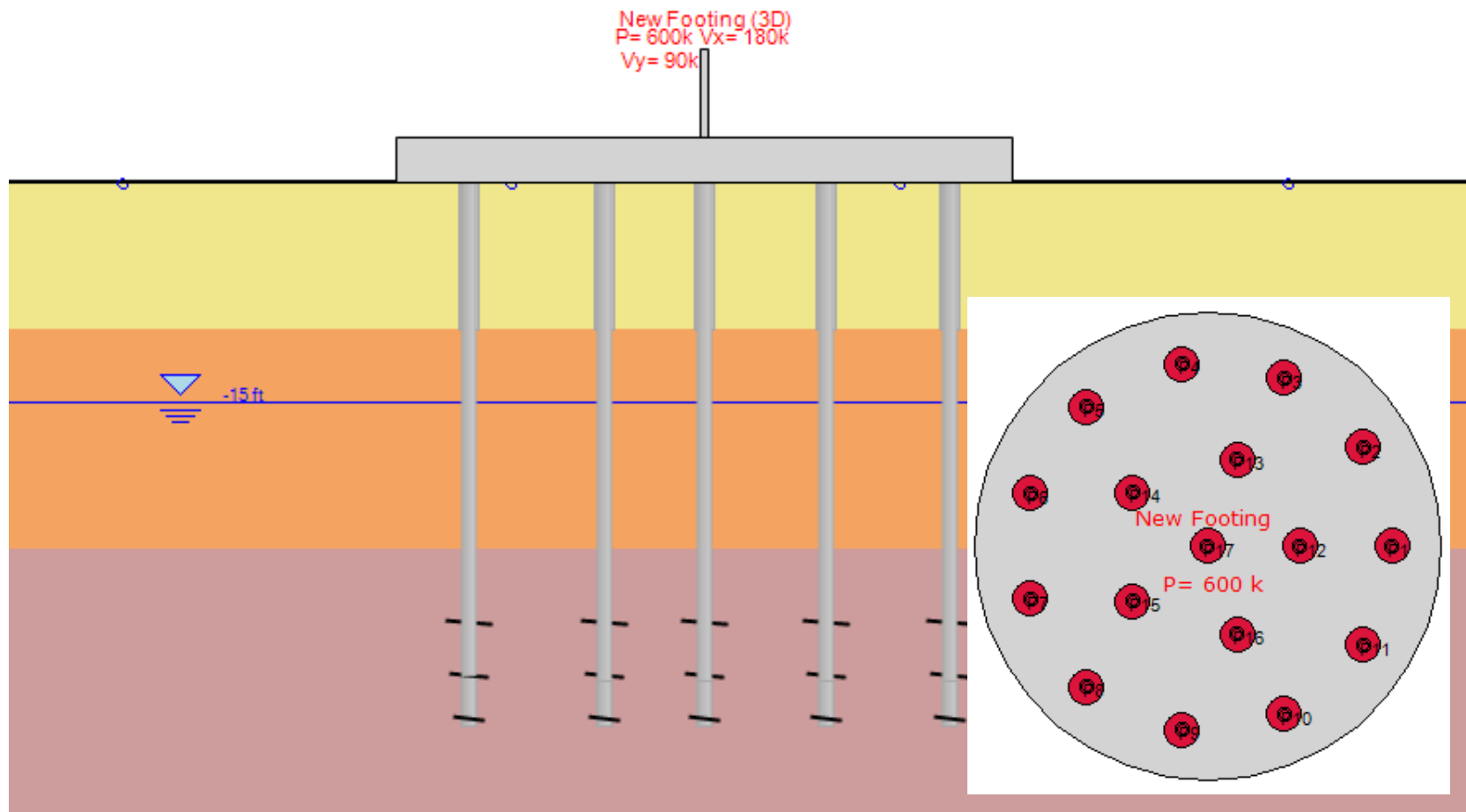


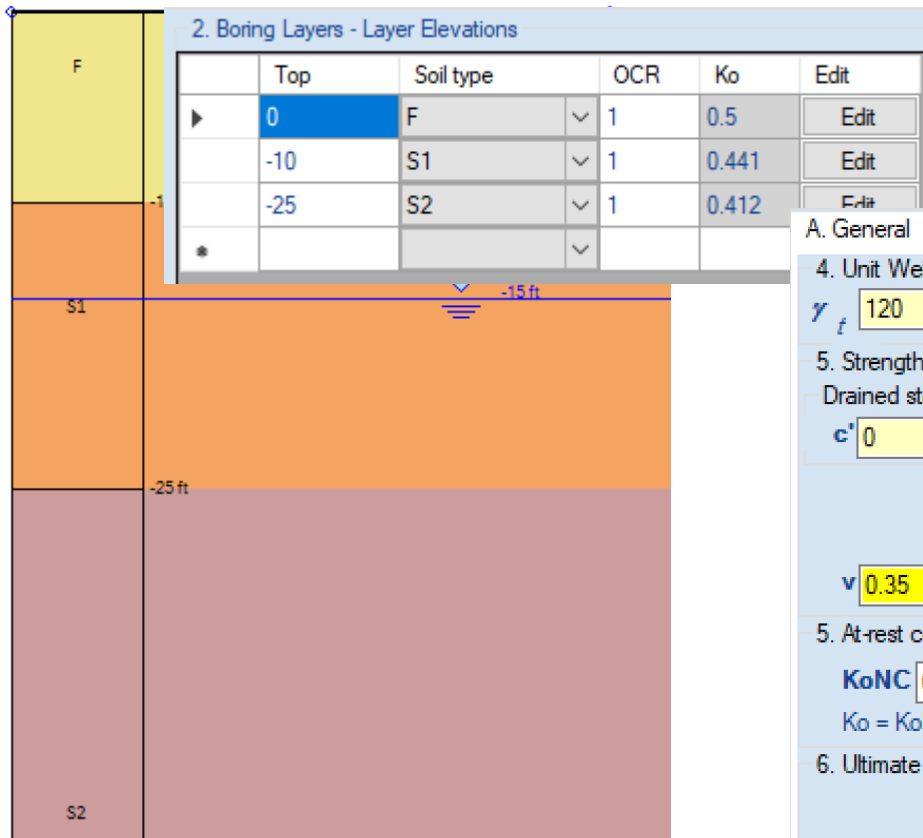
Example 4: Helical Piles Single Pile - Circular Cap (Group) - Circular Raft



A. Soil Properties and Stratigraphy (Soil Layers)

Soil Name	γ_t (pcf)	c' (psf)	S_u (psf)	ϕ' (deg)	E_{exp} (ksi)	K_{sub} (pci)	e_{50}	Q_u (ksf)	RQD (%)	k_{rm}
F	120	0	-	30	$E=300, e=0.5$	30	-	-	-	-
S1	125	0	-	34	$E=400, e=0.5$	50	-	-	-	-
S2	135	200	-	36	$E=600, e=0.35$	100	-	-	-	-

Elev. (ft)	Soil (-)	γ_t (pcf)	C' or S_u (psf)	ϕ' (deg)	E_{oed} (ksf)	m (-)	k_{sub} (pci)
0	F - Sand	120	0	30	300	0.5	30
-10	S1 - Sand	125	0	34	400	0.5	50
-25	S2 - Sand	135	200	36	600	0.35	100



A. General B. Elasto-plastic Lateral E. Adv.

4. Unit Weights - Density
 γ_t 120 pcf γ_{dry} 120 pcf γ'_s 57.6

5. Strength Parameters and Poisson Ratio
 Drained strength properties
 c' 0 psf ϕ' 30 degrees
 v 0.35

5. At-rest coefficients
 K_oNC 0.5 $nOCR$ 0.5
 $K_o = K_oNC * (OCR)^{nOCR}$

6. Ultimate bond (grouted piles when bond option is selected)
 $q_{skin,u}$ 20 psi

A. General B. Elasto-plastic Lateral E. Adv.

Select Model for lateral analysis
 Available models for sand
 Sand API Sand Reese

PY model data
 subgrade reaction modulus k 30 pci

B. Pile Section Properties and Initial Depth

Pile Properties

1. Selection of Support Type
General pile type: **Helical Pile**

2. Support Structural Section Used
Structural Section: **Pipe 4.5"** Edit

3. Dimensions

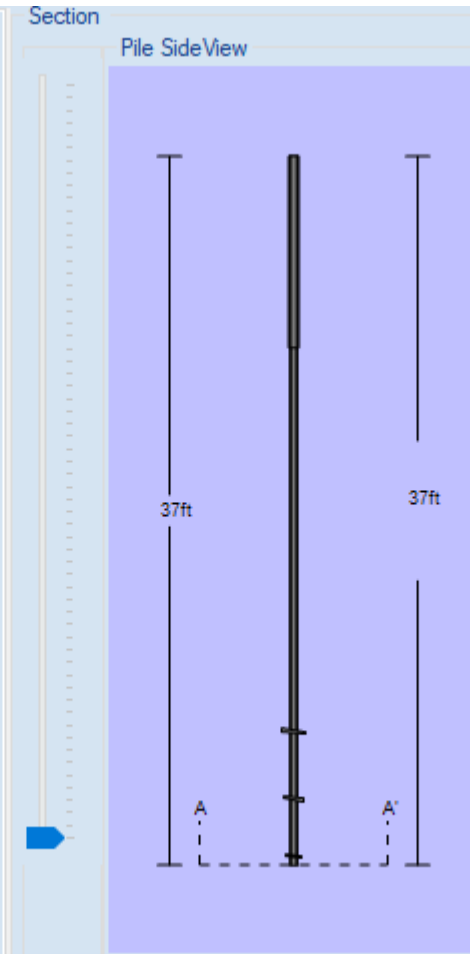
1.1 Coordinates at Top of Pile
X: **0** ft
Z: **0** ft

1.2 Angles
 α : **90** deg

1.3 Lengths
L_{free}: **5** ft
L_{fix}: **32** ft
External casing length: **Lexternal 10** ft

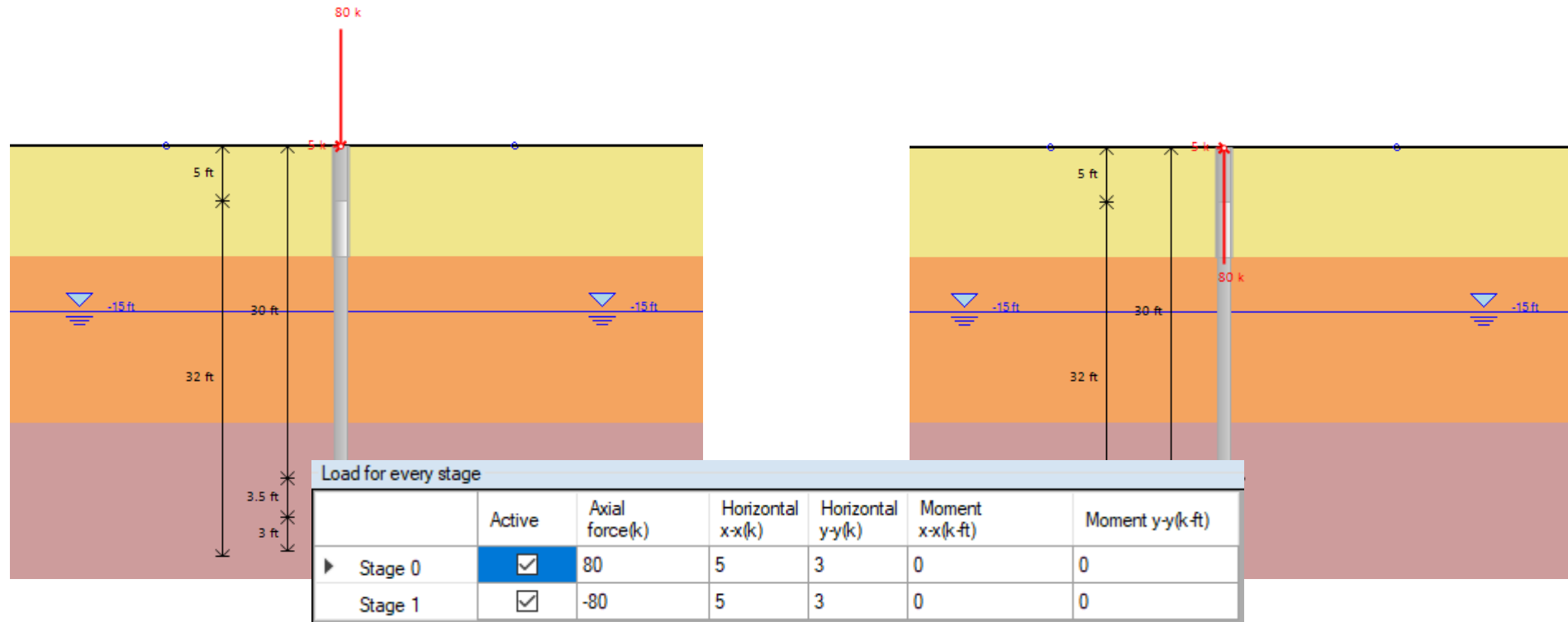
4. Shaft grouting
 Shaft is grouted

5. Activate/Deactivate pile - Permanent or Temporary
 Activate support for this stage: **Temporary support**



X-Coordinate	0
Section Type	Helical Pile
Pile Section	PP4.5X0.336 (Pipe)
Helixes	H10 – H12 – H14
External Casing	PP6X0.336 Pipe
Casing Length	10 ft
Steel Material	65 ksi Steel
Free Length	5 ft
Total Length (Initial)	37 ft

C. Pile Loading



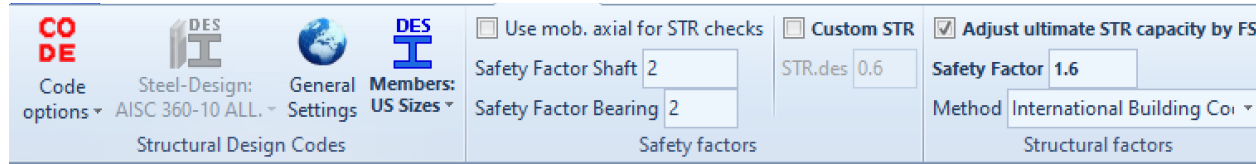
Stage 0: Compression

Stage 1: Tension

**Pile Depth Optimization: Perform Optimization for Selected Loads:
Maximum Depth 50ft, Step: 1ft**

D. Analysis Settings & Design Codes

- Service Conditions - shaft resistance & bearing capacity reduced by 2, structural capacities by 1.6



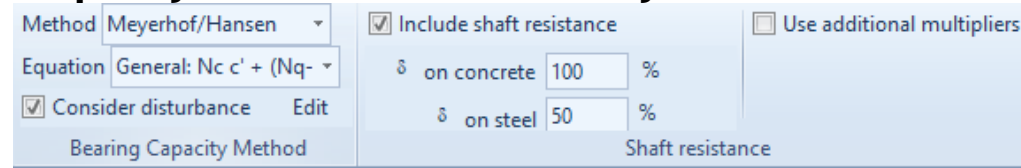
CO DE Code options
 DES Steel-Design: AISC 360-10 ALL.
 General Settings
 DES Members: US Sizes

Use mob. axial for STR checks
 Custom STR
 Adjust ultimate STR capacity by FS

Safety Factor Shaft 2
 Safety Factor Bearing 2
 STR.des 0.6
 Safety Factor 1.6
 Method International Building Co

Structural Design Codes
 Safety factors
 Structural factors

Capacity Calculation Method: Meyerhof/Hansen



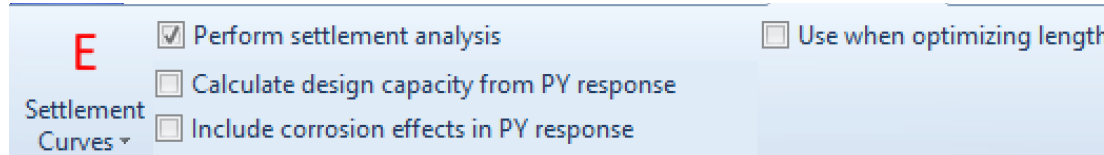
Method Meyerhof/Hansen
 Equation General: $N_c c' + (N_q - \dots)$
 Consider disturbance Edit

Include shaft resistance
 Use additional multipliers

δ on concrete 100 %
 δ on steel 50 %

Bearing Capacity Method
 Shaft resistance

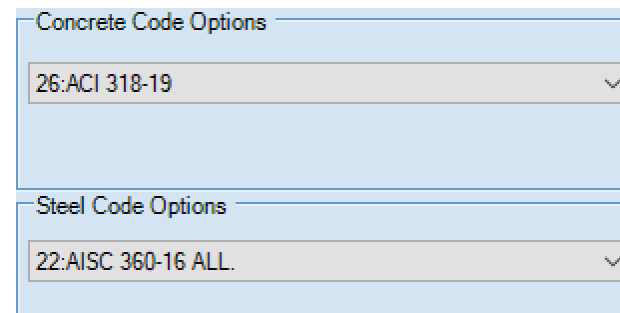
Estimate Settlements



E Perform settlement analysis
 Use when optimizing length

Settlement Curves Calculate design capacity from PY response
 Include corrosion effects in PY response

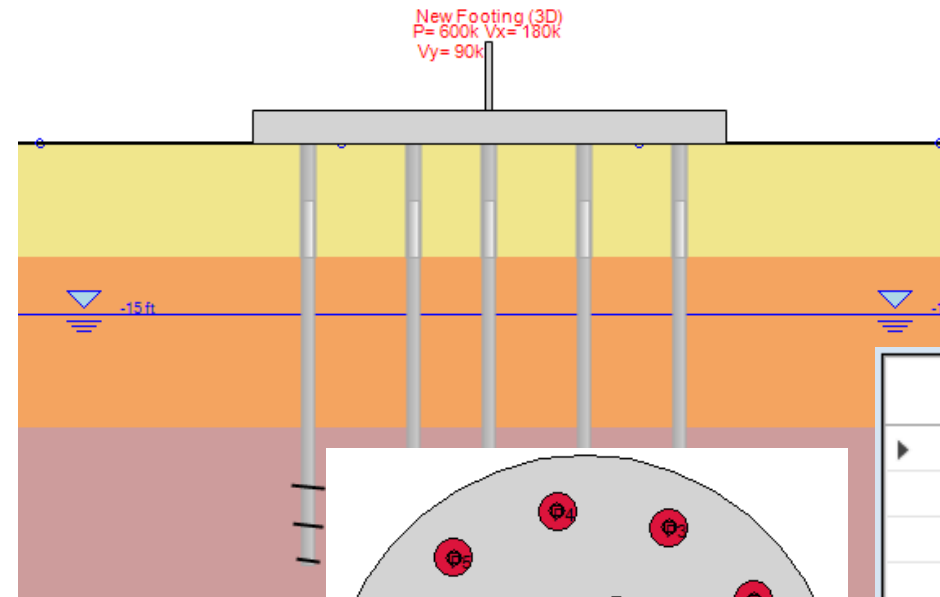
- Steel Code: AISC 360-16 Allowable
 - Concrete Code: ACI 318-19



Concrete Code Options
 26:ACI 318-19

Steel Code Options
 22:AISC 360-16 ALL.

F. Pile Cap Properties (Shape, size, pile locations, loading)



Name:

X: ft T: ft

Z: ft L: ft

Y: ft Place At Surface

Circular pile cap

Plan dimensions
Radius: ft

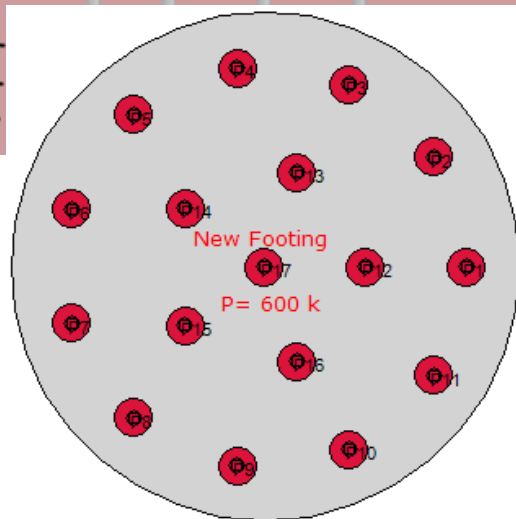
Loading mode:

P: k Torsion: k-ft

Lateral Fx: k Lateral Fy: k

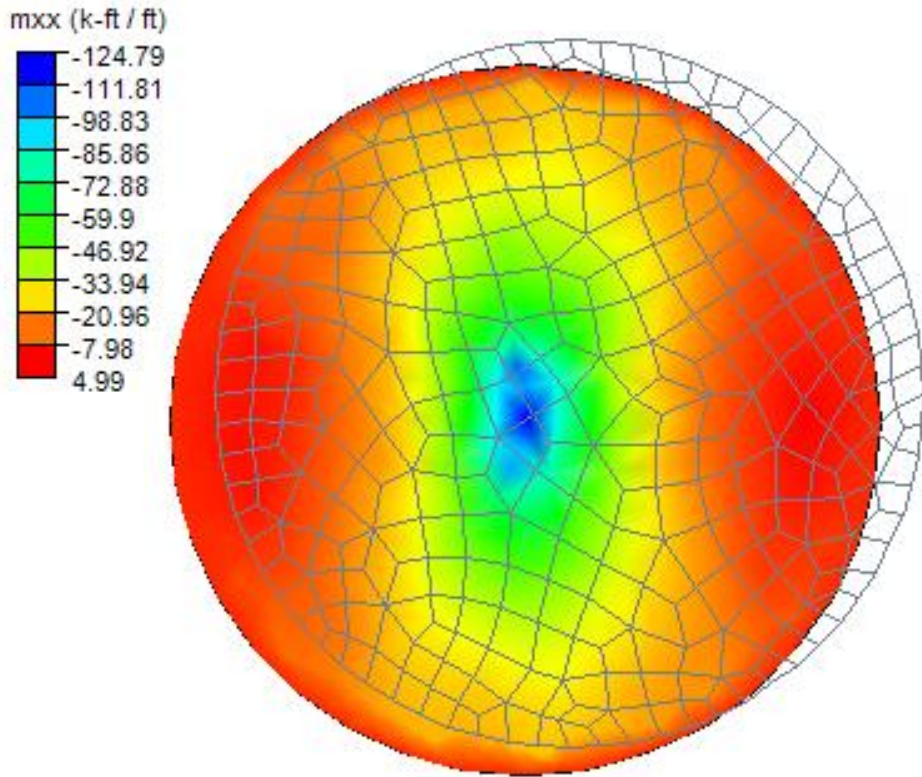
Moment Mxx: k-ft Moment Myy: k-ft

Concrete material:

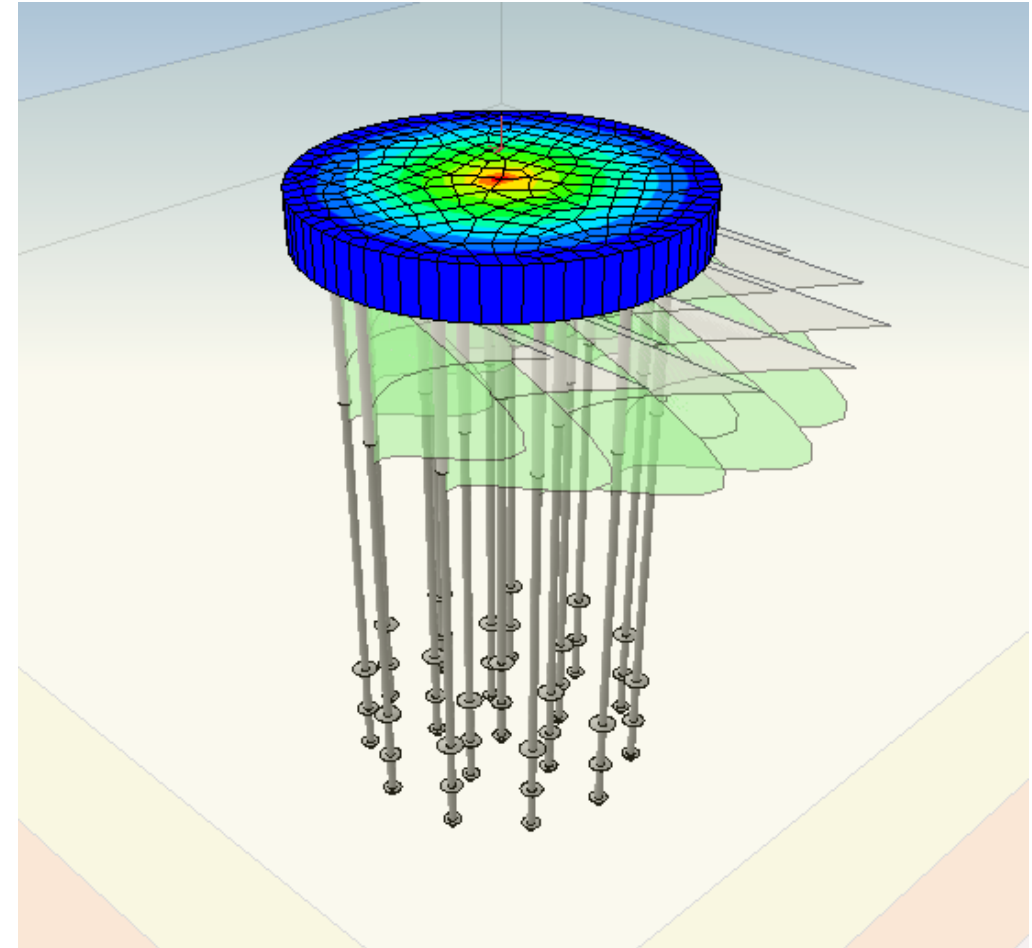


Pile Name	x	y	Length	Local Rotation	Edit Pile
P1	6.312	0	37	0	Edit
P2	5.30999...	3.41252...	37	0	Edit
P3	2.62209...	5.74159...	37	0	Edit
P4	-0.89829...	6.24775...	37	0	Edit
P5	-4.13348...	4.77029...	37	0	Edit
P6	-6.05631...	1.77829...	37	0	Edit
P7	-6.05631...	-1.77829...	37	0	Edit
P8	-4.13348...	-4.77029...	37	0	Edit
P9	-0.89829...	-6.24775...	37	0	Edit
P10	2.62209...	-5.74159...	37	0	Edit
P11	5.30999...	-3.41252...	37	0	Edit
P12	3.156	0	37	0	Edit
P13	0.97525	3.00153	37	0	Edit

G2. Pile Group Results (Top View & 3D)

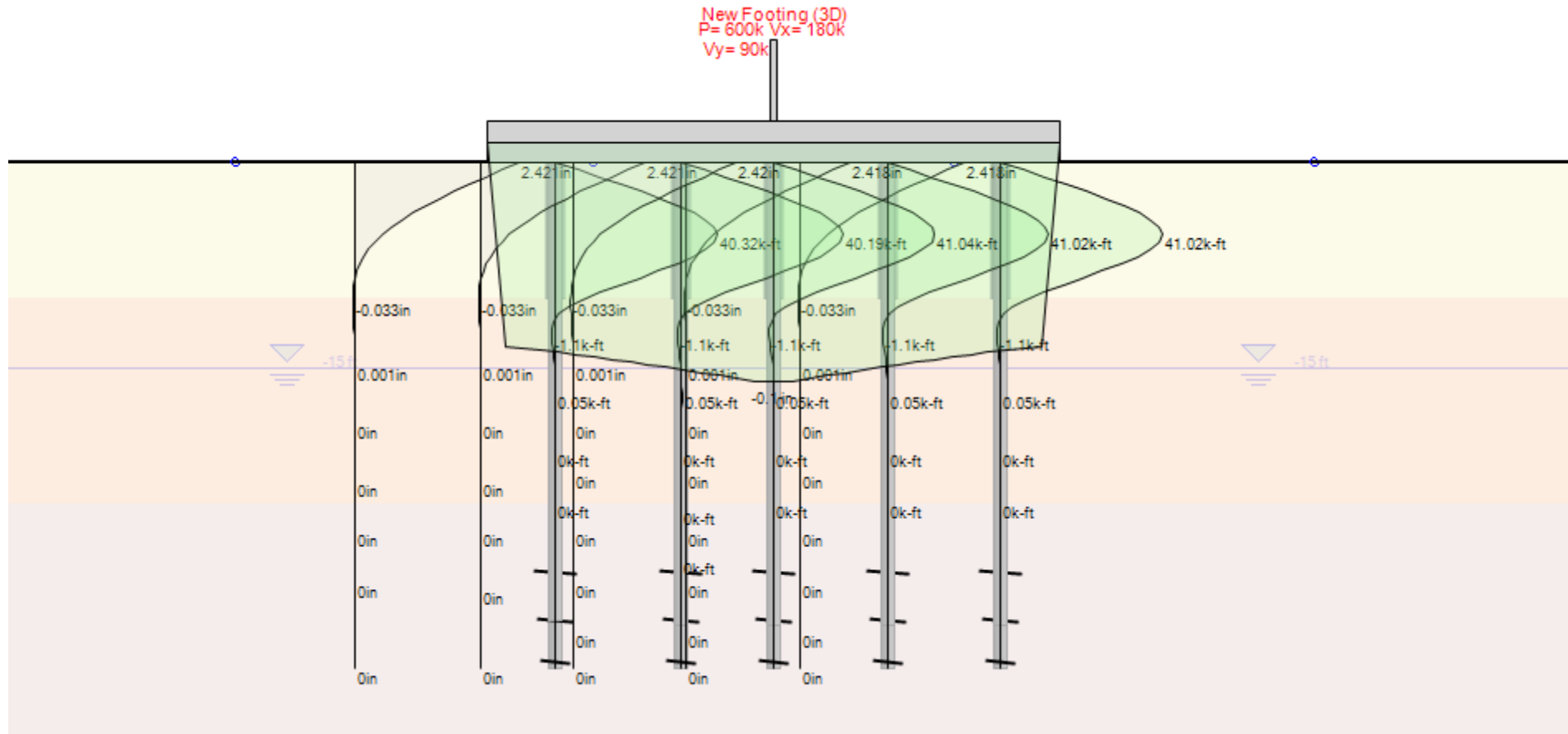


FEM Mesh & Cap Moment Shadings



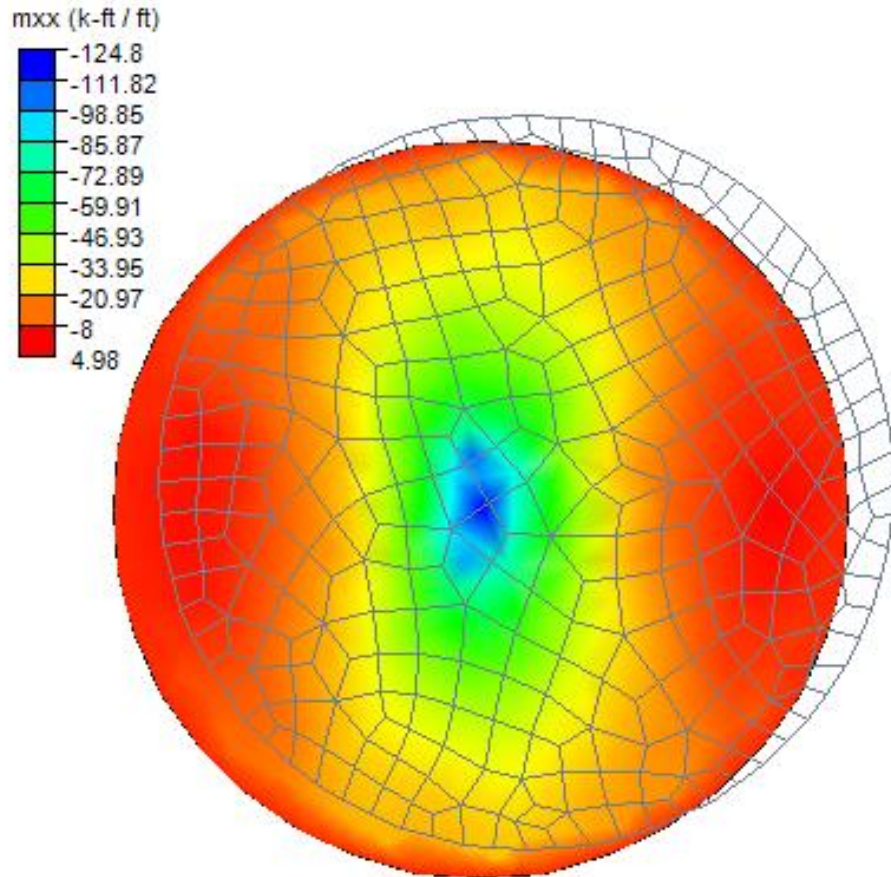
Cap Settlements & Pile Graphs - 3D Model

H1. Pile Raft Results (Elevation View)

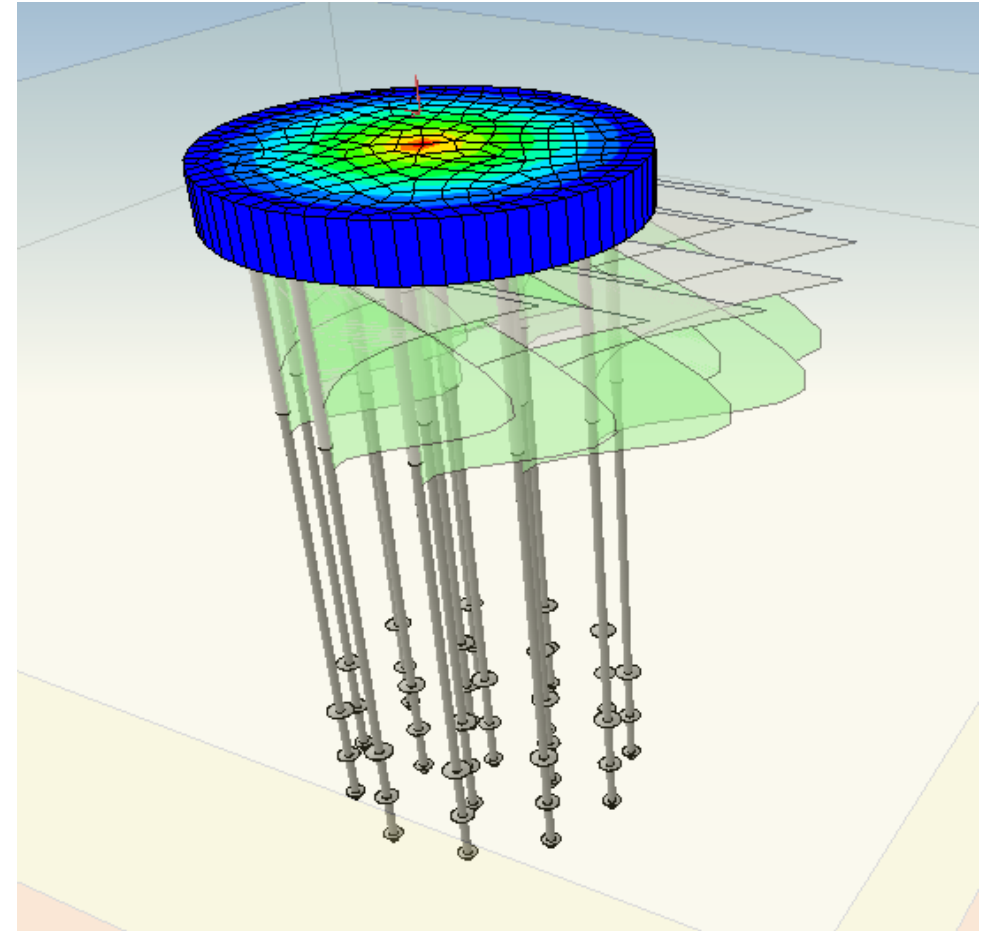


Pile Displacement & Moment Graphs (X-Direction), Pile Cap Settlement

H2. Pile Raft Results (Top View & 3D)



FEM Mesh & Cap Displacement Shadings



Cap Settlements & Pile Graphs - 3D Model

Thank You!

More Examples & Videos:

Review Training Materials
www.deepexcavation.com

Licensing Information:

Contact Us
E: sales@deepexcavation.com

Online Presentations & Training:

Book a Meeting
Access Online Calendar