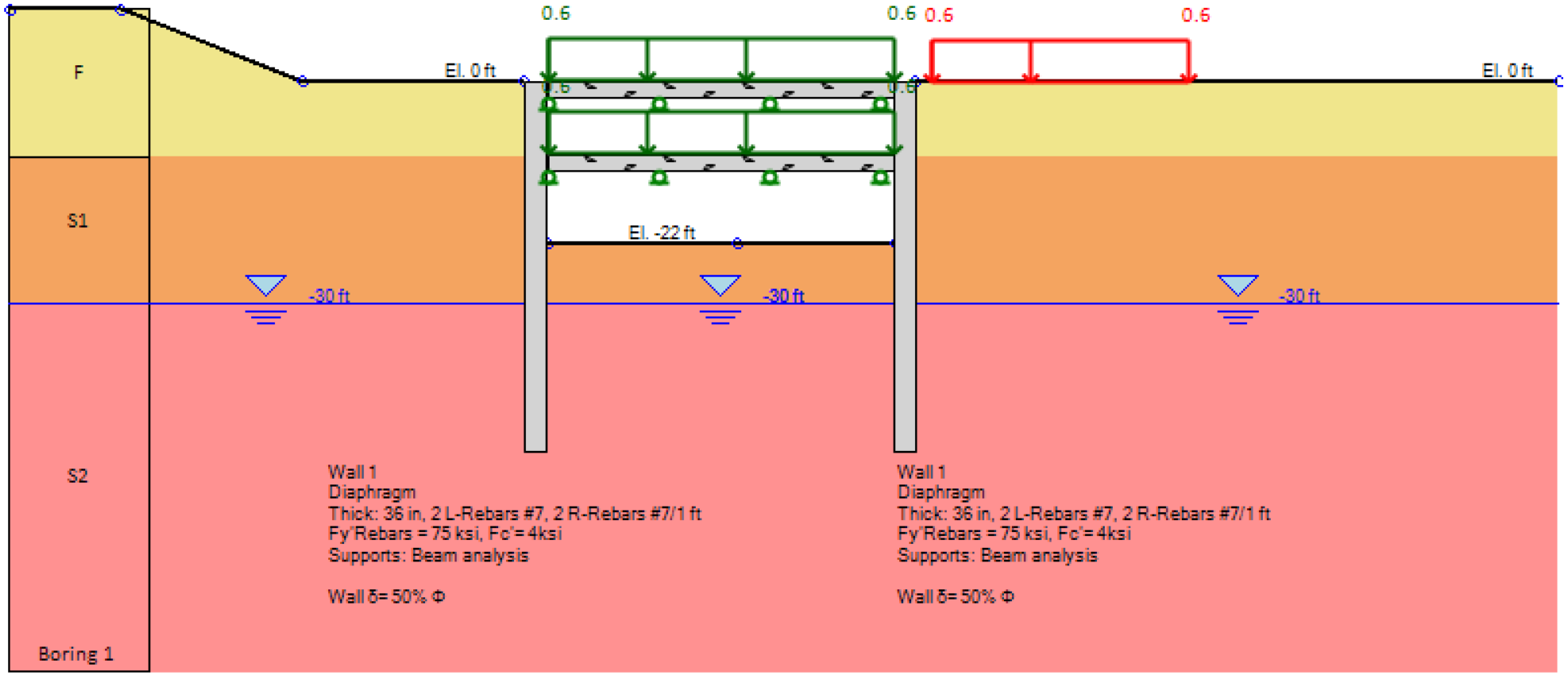
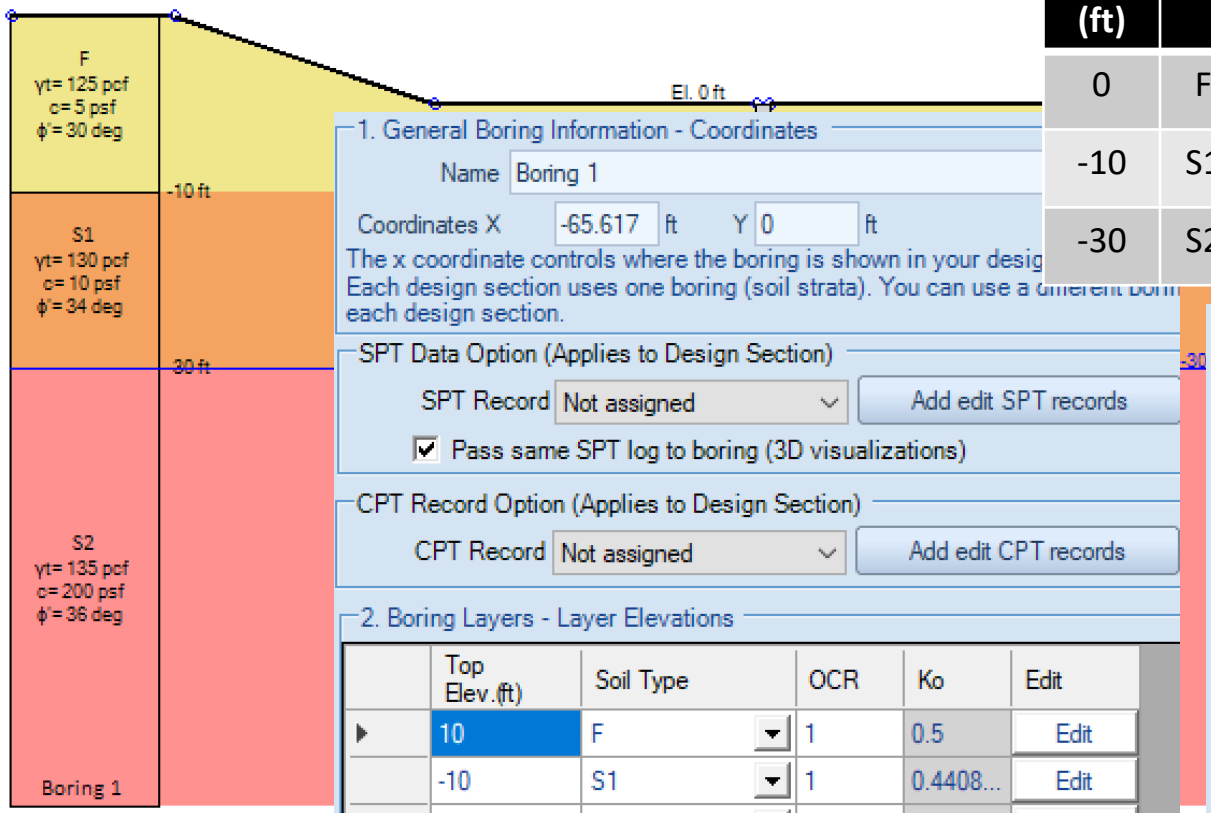
Example 5: Top-Down Excavation with Concrete Slabs
Limit Equilibrium – Non-Linear Analysis



Example 5: Top-Down Excavation

A. Soil Properties and Stratigraphy (Soil Layers)

Elev. (ft)	Soil (-)	γt (pcf)	C' or Su (psf)	ϕ' (deg)	Eoed (ksf)	Eur (ksf)	m (-)
0	F - Sand	125	5	30	500	1500	0.5
-10	S1 - Sand	130	10	34	800	2400	0.4
-30	S2 - Sand	135	200	36	1200	3200	0.4



1. General Boring Information - Coordinates

Name: Boring 1

Coordinates X: -65.617 ft Y: 0 ft

The x coordinate controls where the boring is shown in your desig
Each design section uses one boring (soil strata). You can use a
each design section.

SPT Data Option (Applies to Design Section)

SPT Record: Not assigned — Add edit SPT records

☑ Pass same SPT log to boring (3D visualizations)

CPT Record Option (Applies to Design Section)

CPT Record: Not assigned — Add edit CPT records

2. Boring Layers - Layer Elevations

	Top Elev.(ft)	Soil Type	OCR	Ko	Edit
▶	10	F	1	0.5	Edit
	-10	S1	1	0.4408...	Edit
	-30	S2	1	0.412	Edit
*					

A. General | C. Elasto-plastic | D. Bond | E. Adv. | F. Piles

4. Unit Weights - Density

γ_t 130 pcf γ_{bulk} 125 pcf γ' = 67.6

5. Strength Parameters and Poisson Ratio

Drained strength properties

c' 10 psf ϕ' 34 degrees

Peak - constant vol. (for estimation)

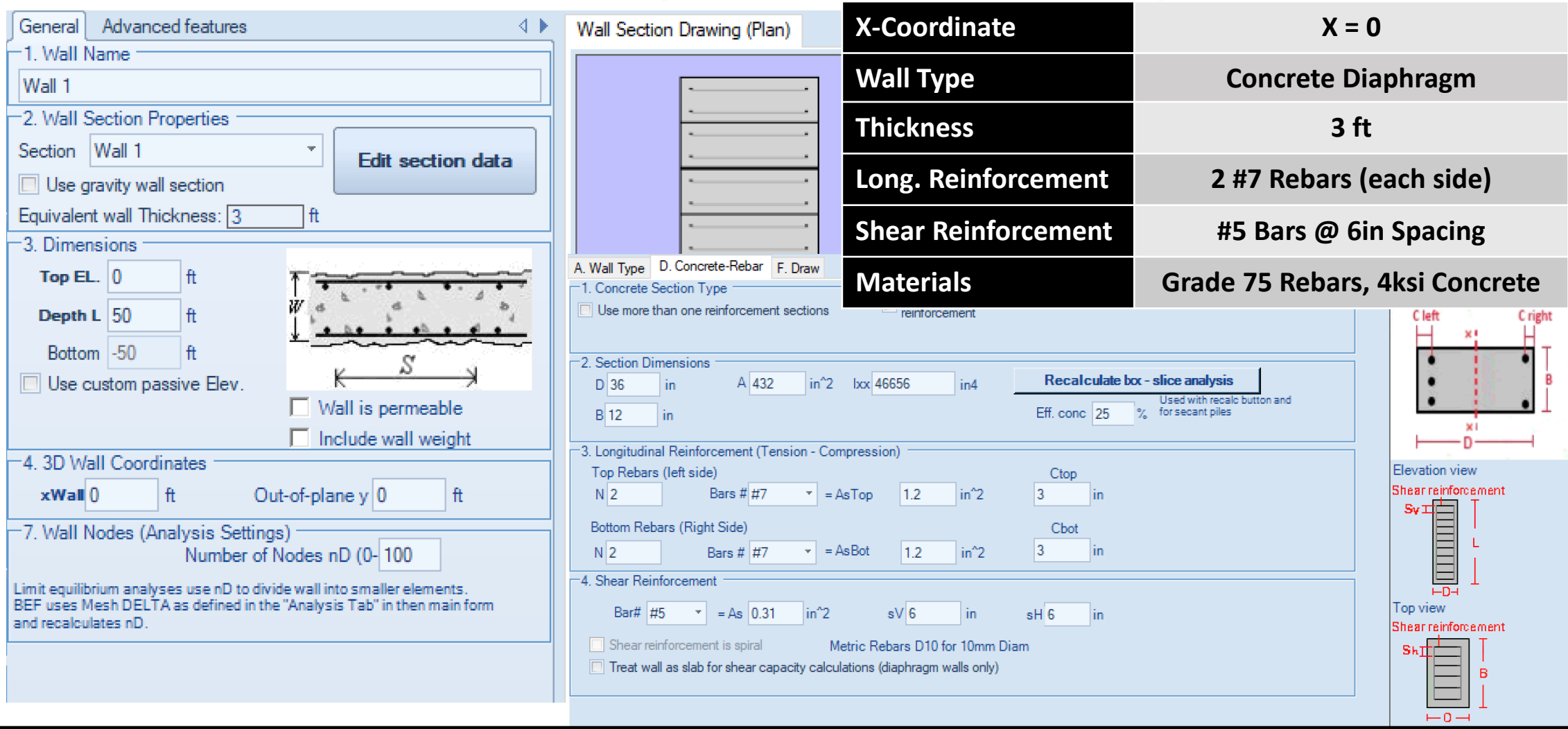
Φ cv' Omitted degrees

Φ peak' Omitted degrees

v 0.35

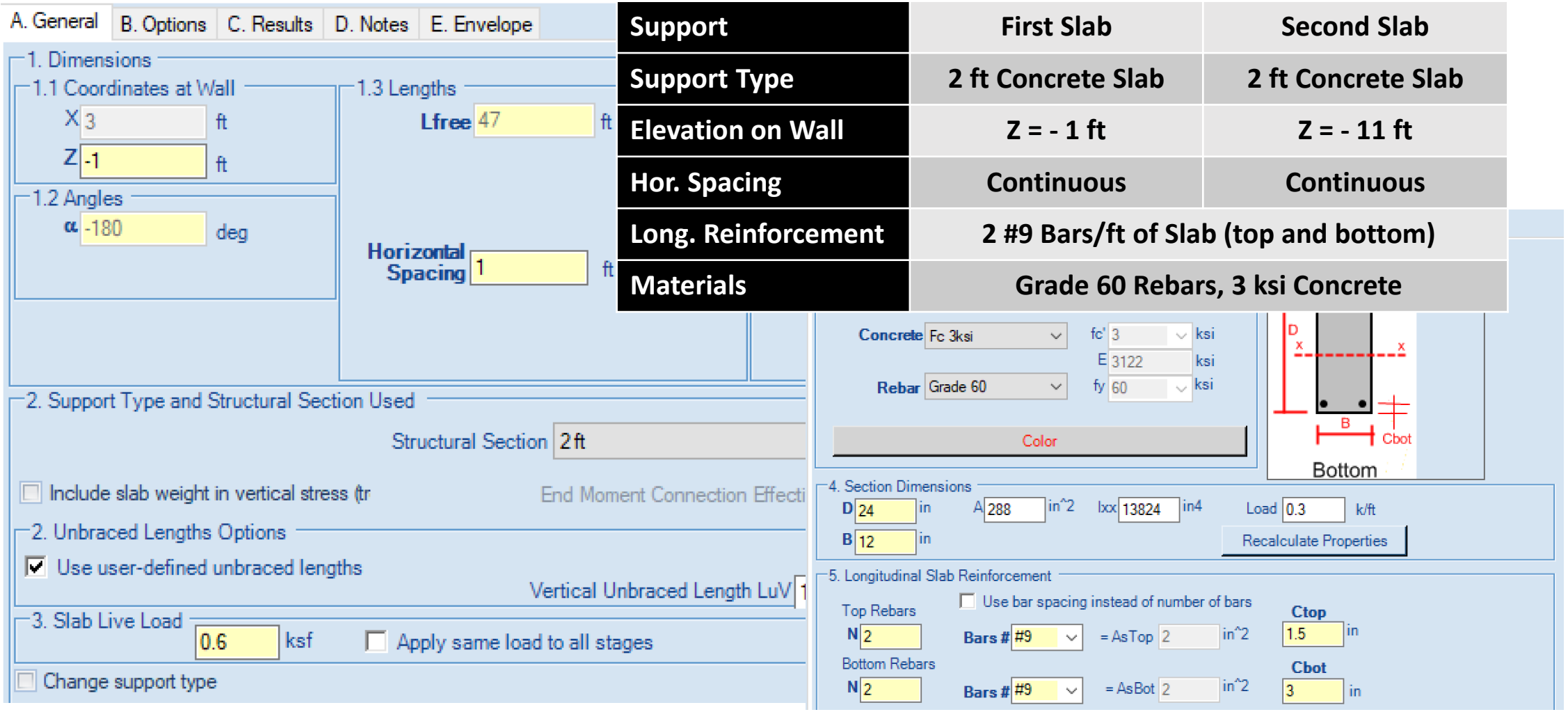
B. Wall Section Properties, Wall Position and Depth

X-Coordinate	X = 0
Wall Type	Concrete Diaphragm
Thickness	3 ft
Long. Reinforcement	2 #7 Rebars (each side)
Shear Reinforcement	#5 Bars @ 6in Spacing
Materials	Grade 75 Rebars, 4ksi Concrete

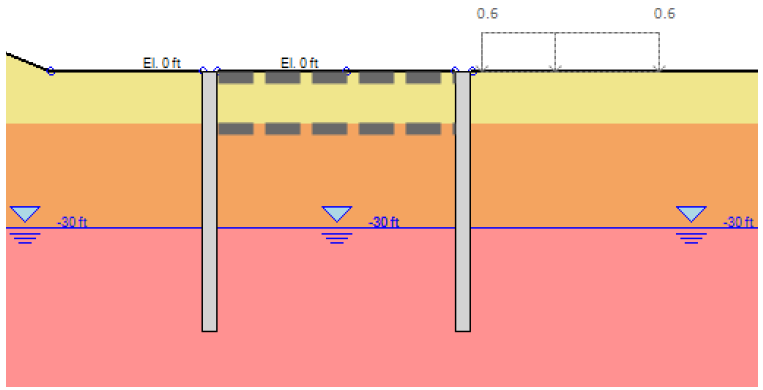


C. Support Section Properties and Elevations

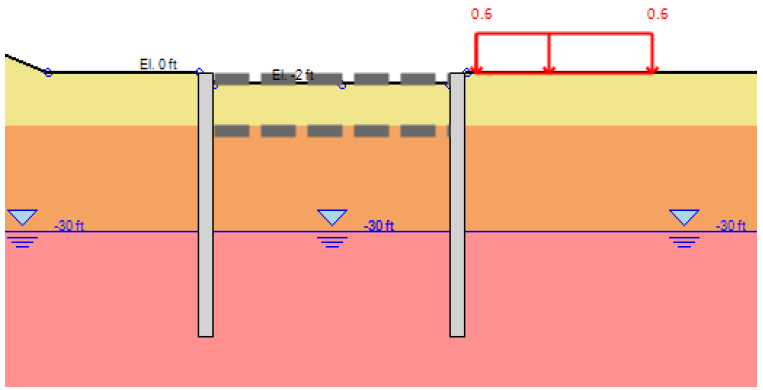
Support	First Slab	Second Slab
Support Type	2 ft Concrete Slab	2 ft Concrete Slab
Elevation on Wall	Z = - 1 ft	Z = - 11 ft
Hor. Spacing	Continuous	Continuous
Long. Reinforcement	2 #9 Bars/ft of Slab (top and bottom)	
Materials	Grade 60 Rebars, 3 ksi Concrete	



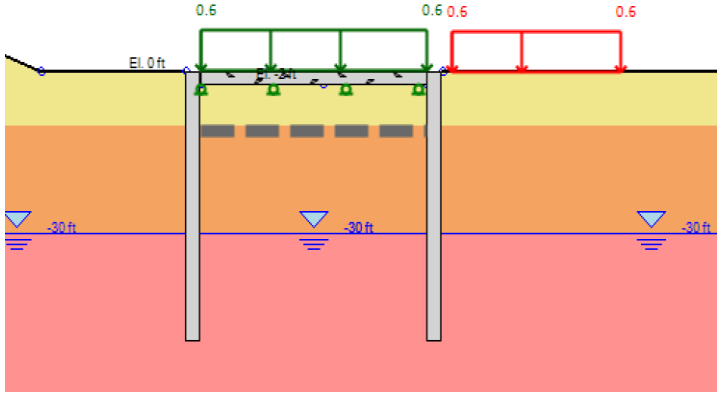
D. Model in Construction Stages



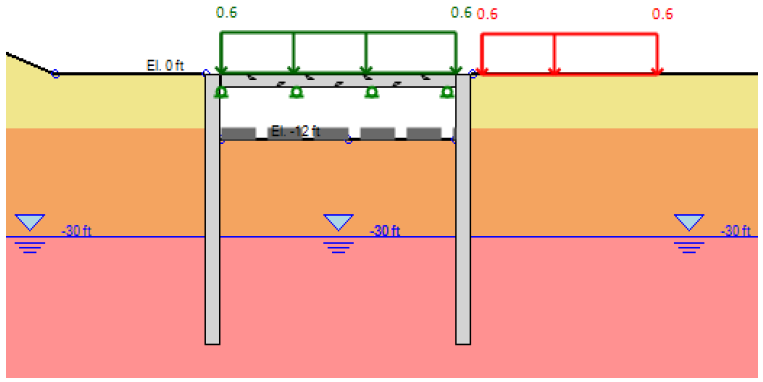
Stage 0: At-rest Conditions



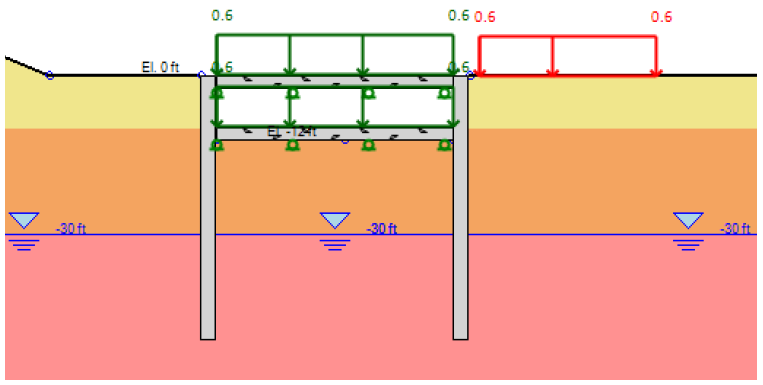
Stage 1: Initial Excavation



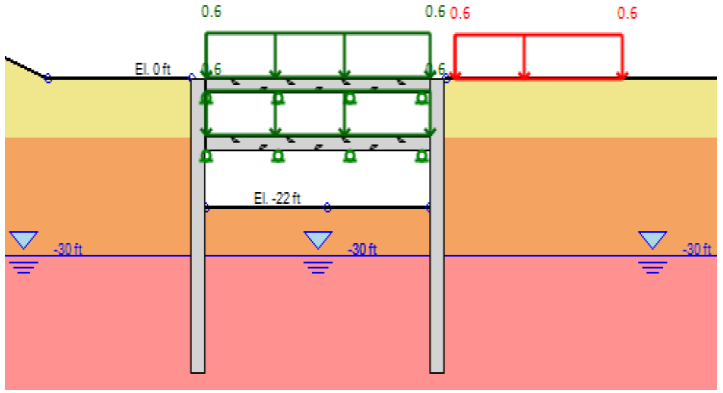
Stage 2: Support Installation



Stage 3: Excavation



Stage 4: Support Installation

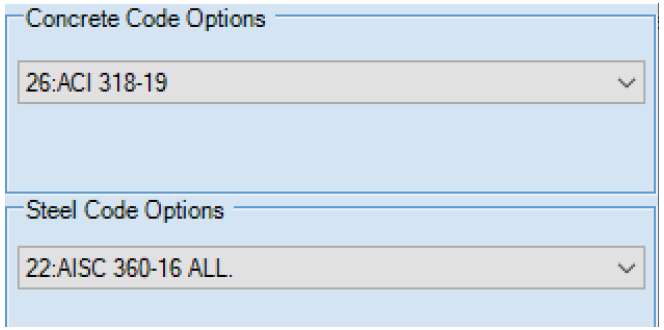


Stage 5: Excavation

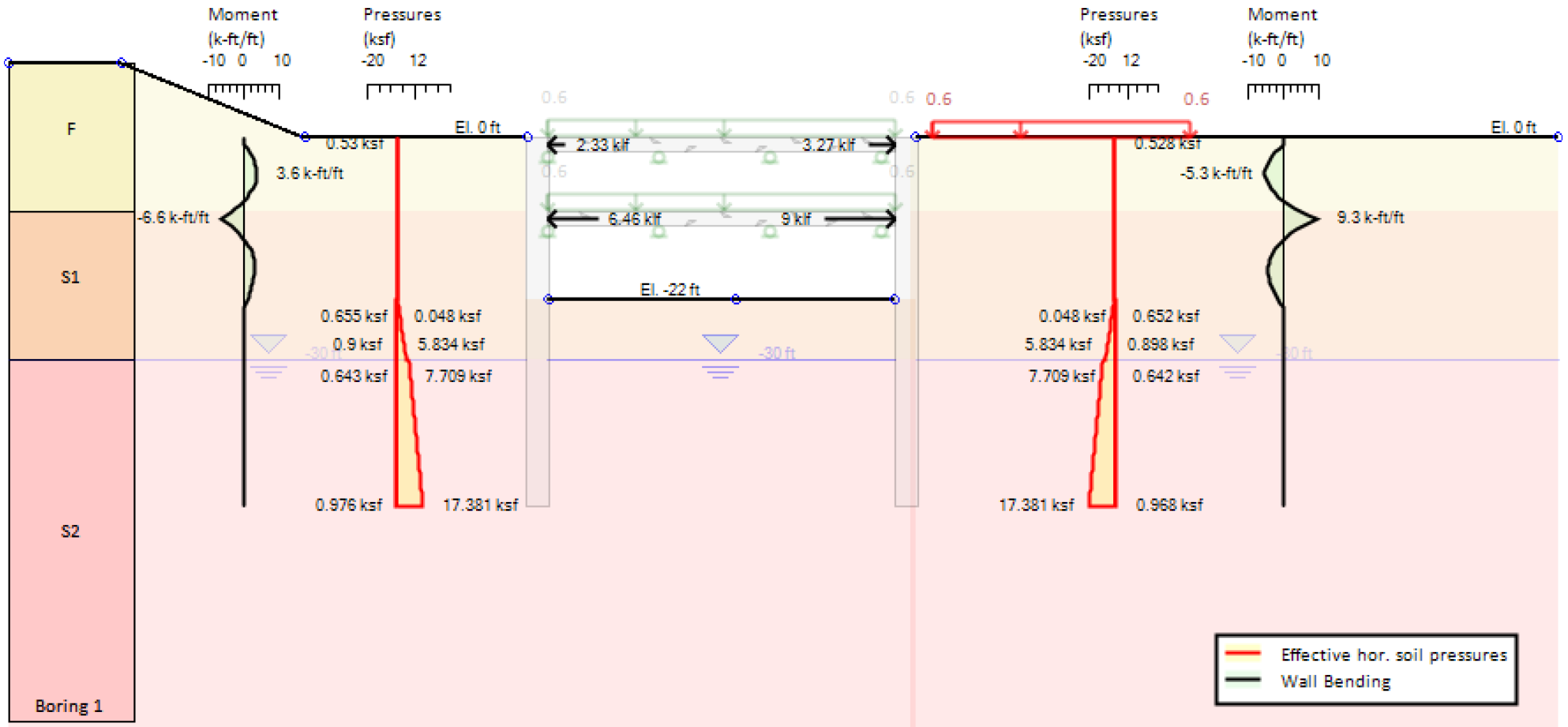
E. Analysis Settings & Design Codes

- Wall Friction: 50% of the soil friction
- Water Pressures: Simplified Flow
- Cantilever Method (LEM): Free Earth Method
- Beam Analysis Method: Blum's
- Soil Pressures: Active & Passive (Stages 0 to 3), FHWA Apparent (Stages 4 to 5)

- Steel Code: AISC 360-16 Allowable
- Concrete Code: ACI 318-19
- Analysis Code: None (Service Conditions)

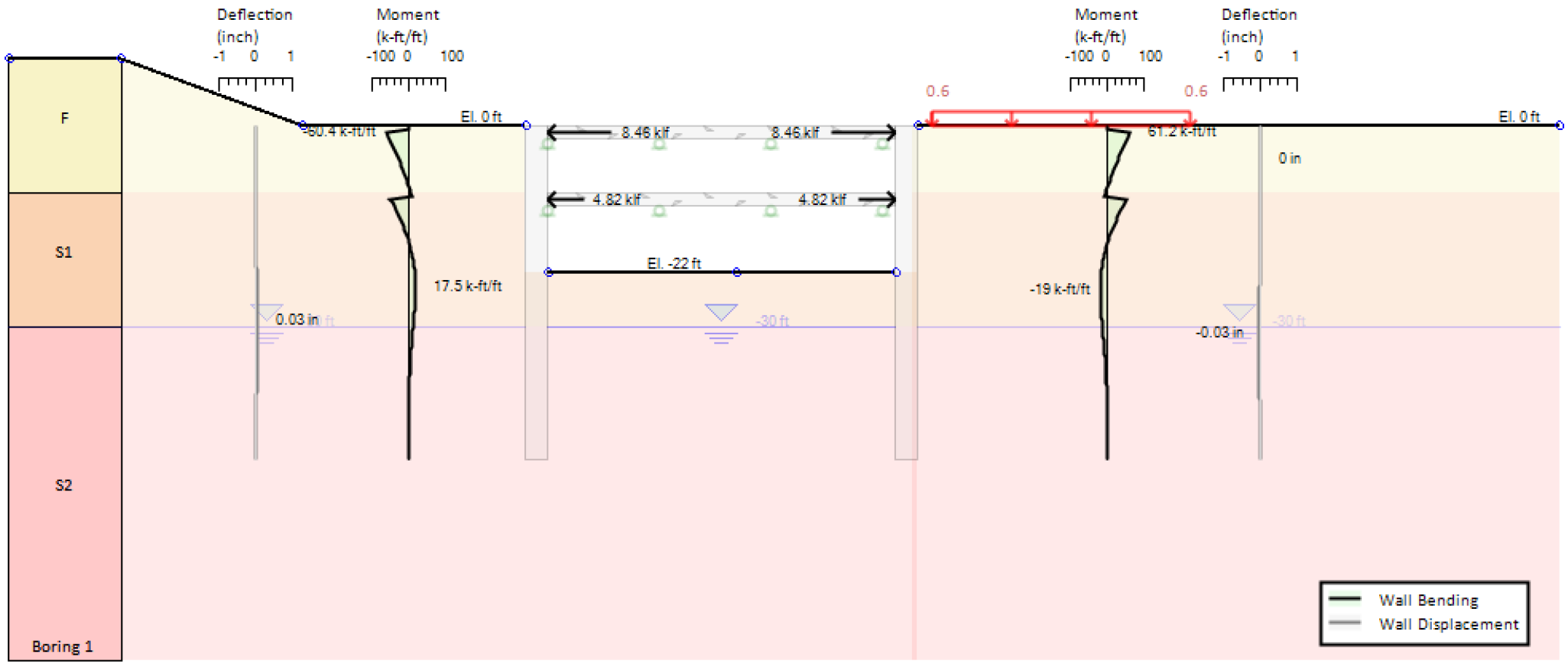


F1. LEM Analysis Results



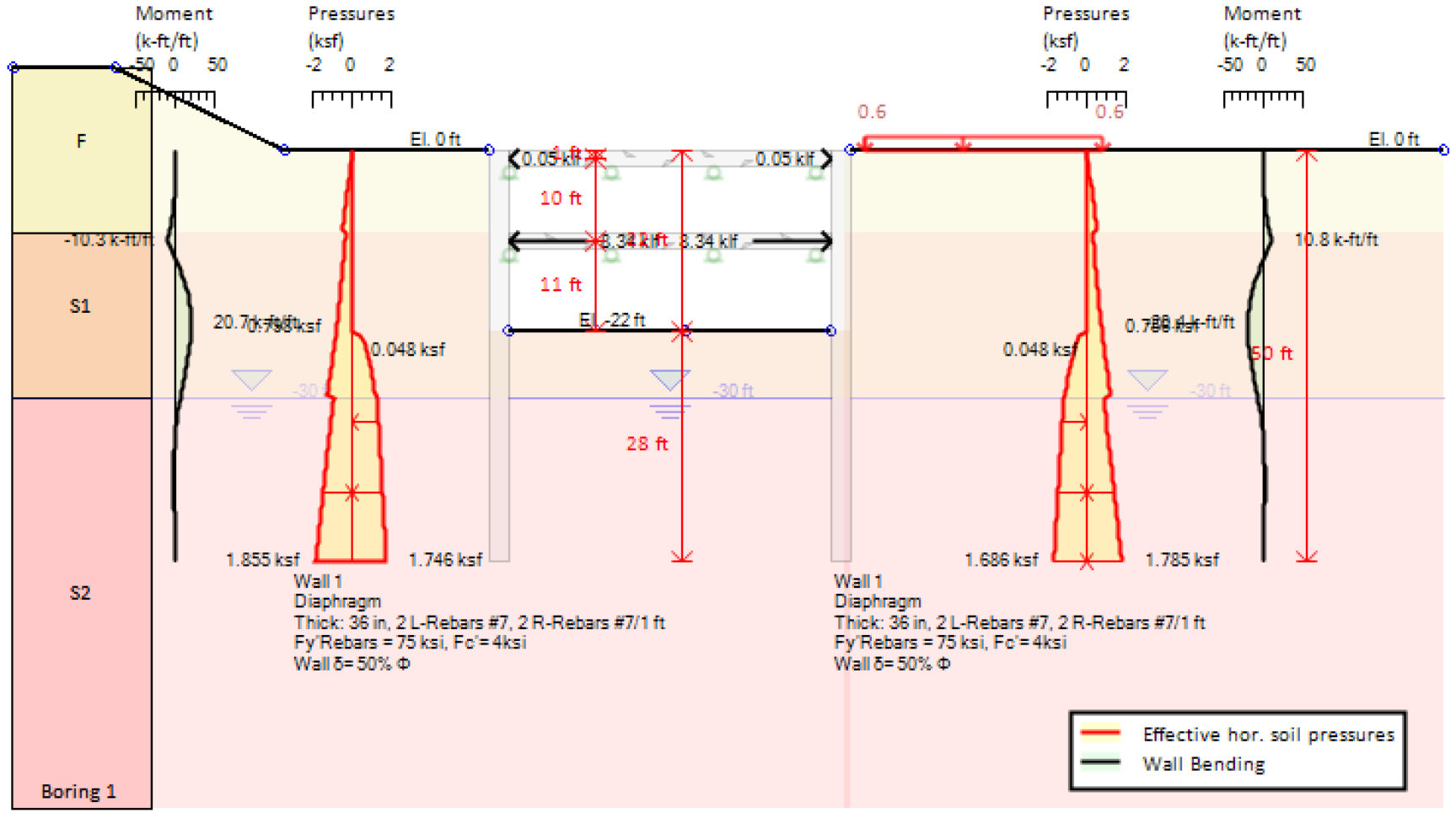
Wall Moments, Support Reactions & Soil Pressures - Stage 5

F2. LEM Analysis Results



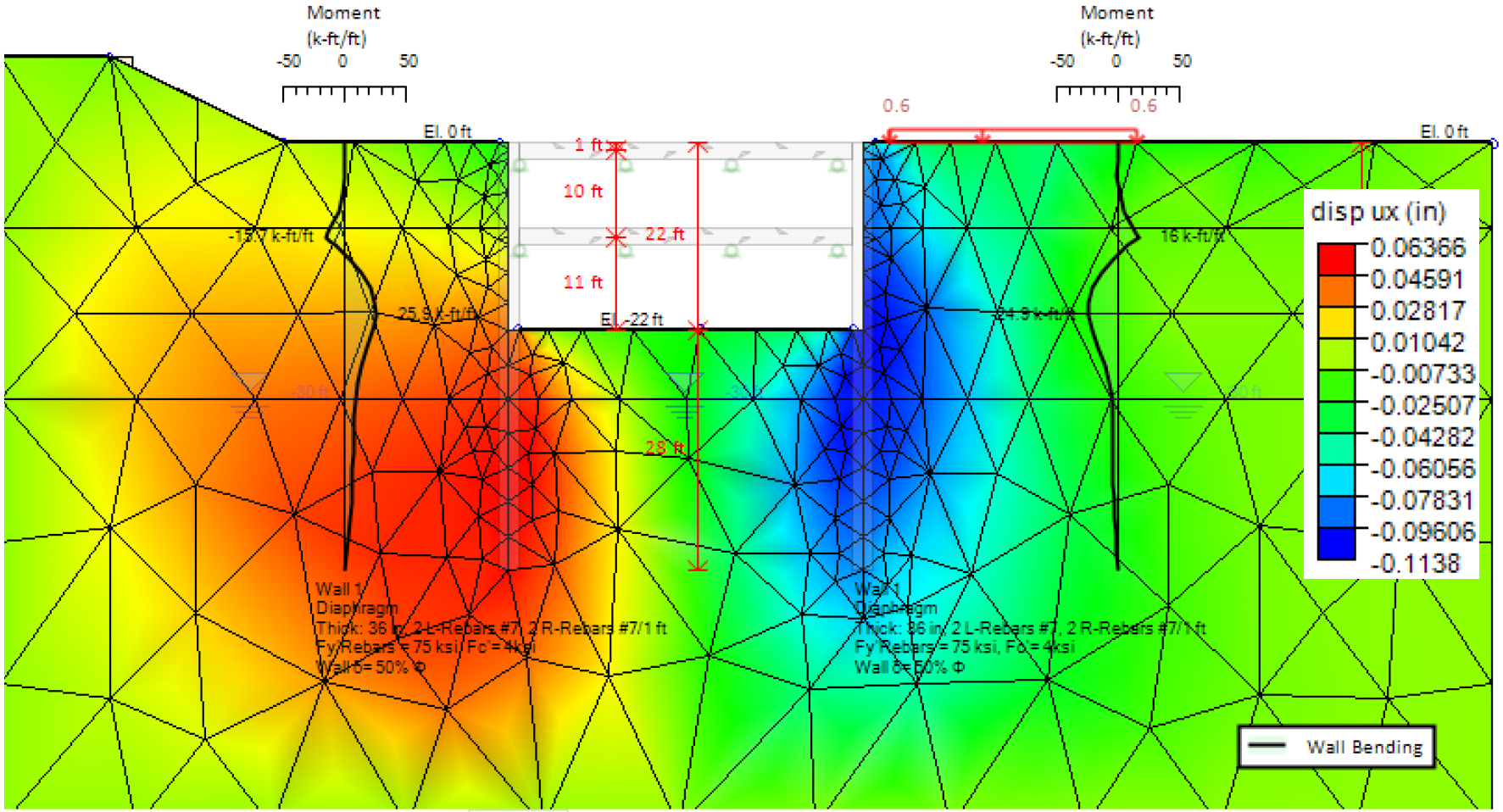
Wall Moments & Displacements, Support Reactions - Stage 5

G. Non-Linear Analysis Results



Wall Moments, Support Reactions & Soil Pressures - Stage 5

H. FEM Analysis Results



Wall Moments, Generated Mesh & Soil Displacement Shadings - Stage 5

Thank You!

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