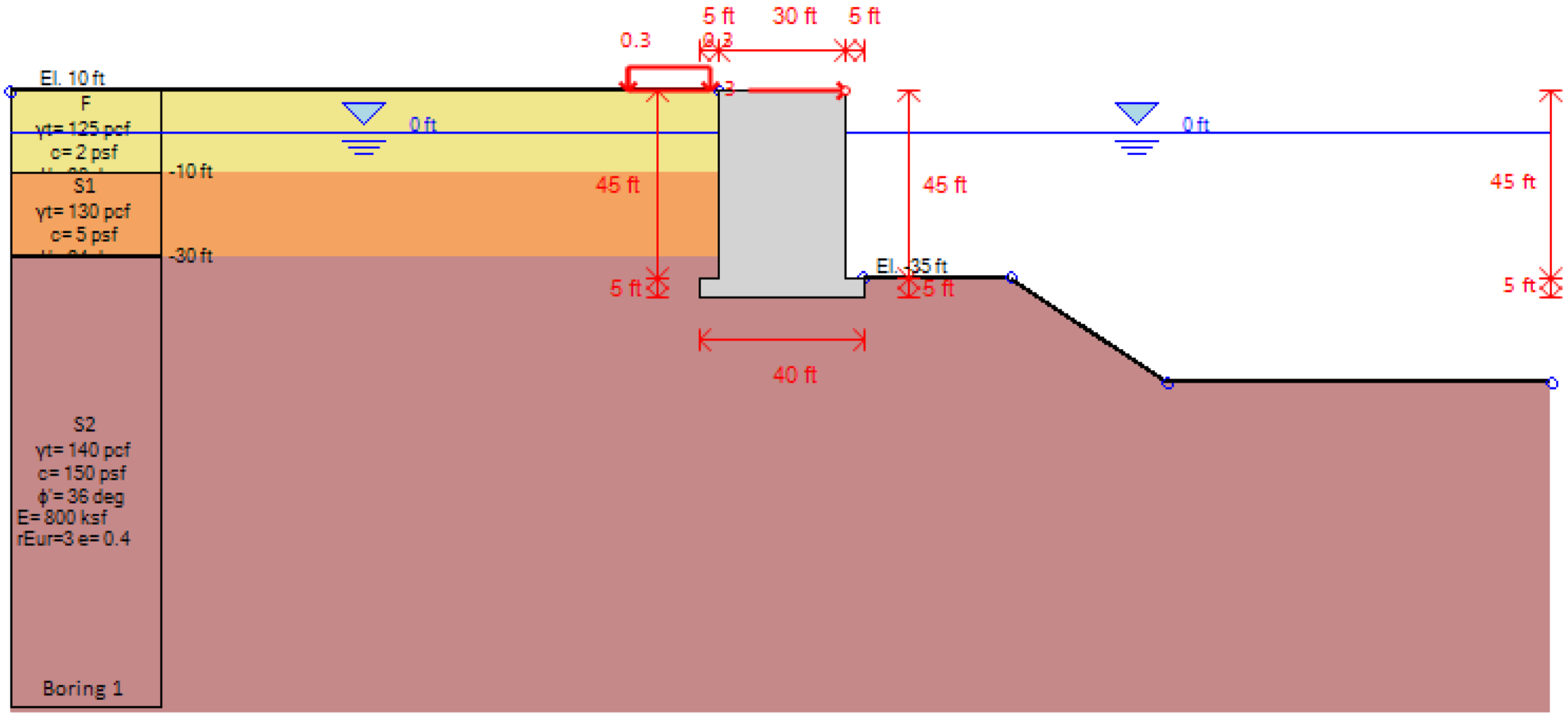
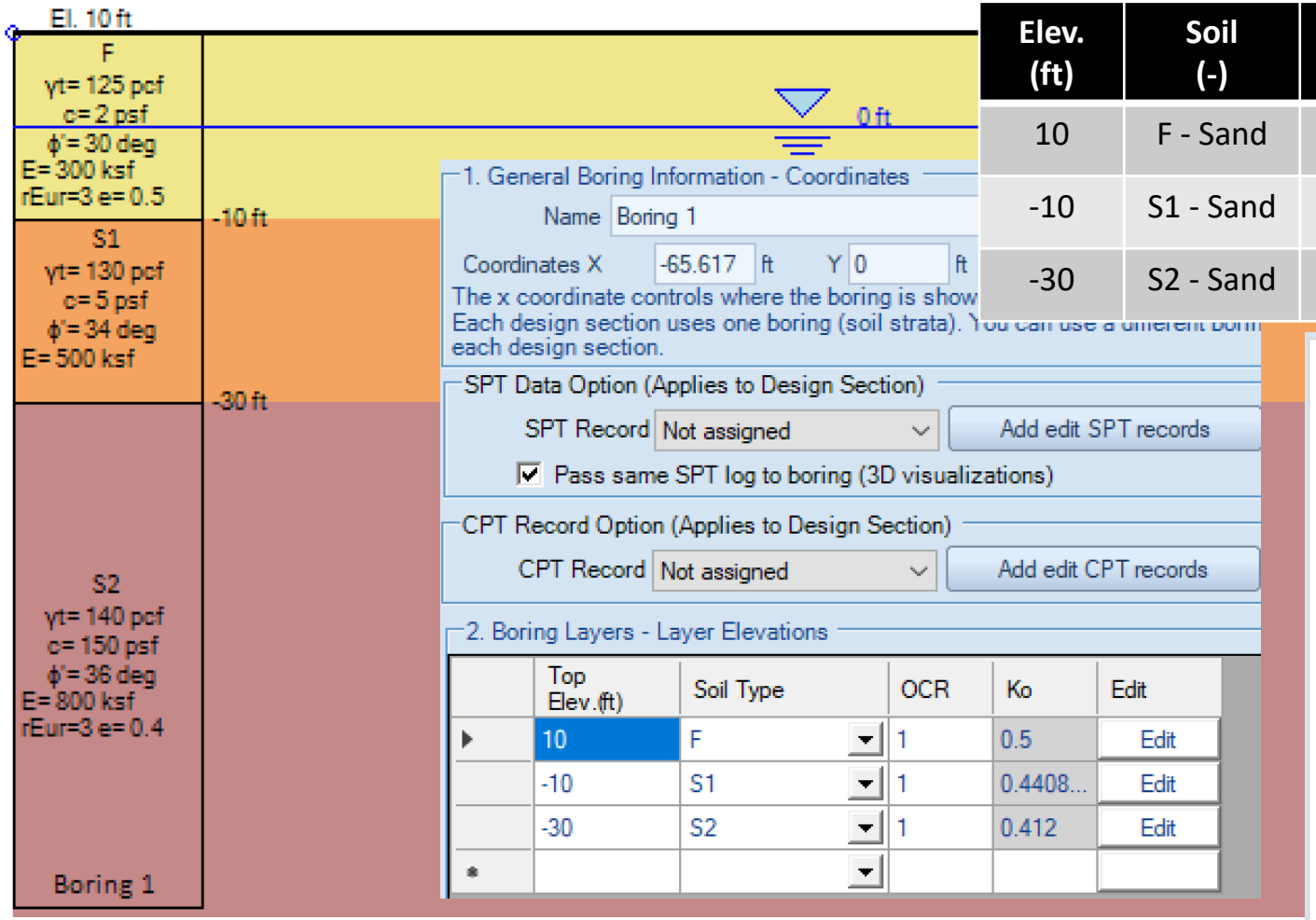
Example 10: Quay Wall - Block Type Caisson
Limit Equilibrium – Finite Element Analysis – Slope Stability Analysis

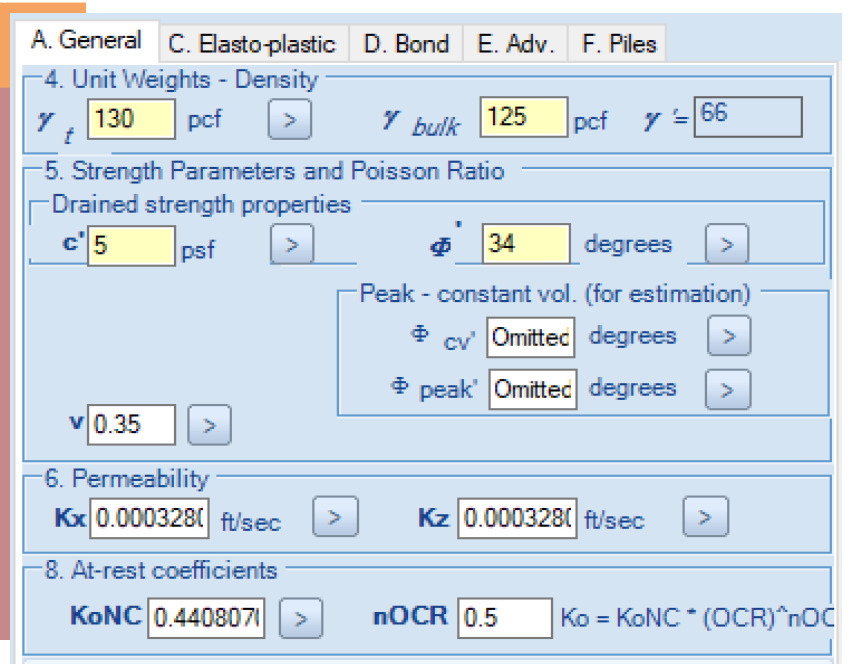


Example 10: Quay Wall - Block Type Caisson

A. Soil Properties and Stratigraphy (Soil Layers)



Elev. (ft)	Soil (-)	γt (pcf)	C' (psf)	ϕ' (deg)	E (ksf)	exp (-)
10	F - Sand	125	2	30	300	0.5
-10	S1 - Sand	130	5	34	500	0.4
-30	S2 - Sand	135	150	36	800	0.4



B. Quay Wall - Block Type Caisson Section Properties

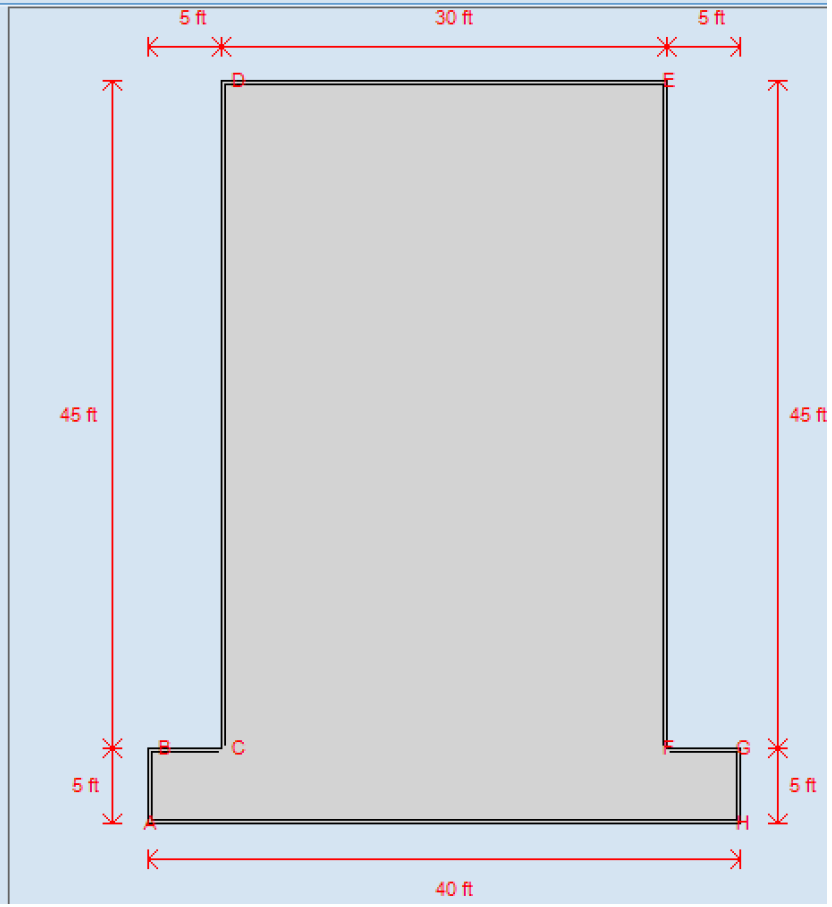
Dimensions | Materials | Results | Descriptions

Height 50 ft
Base 40 ft
Top Width 30 ft
Distance to left Top corner 5 ft
Heel Thick 5 ft
Toe width ft
Toe Thick 5 ft
Heel width ft
☐ Use key
☐ Drain back face
☐ Use a rectangular cap at the top

Wall Name: New Gravity Wall — Gravity wall

1. Reinforcement

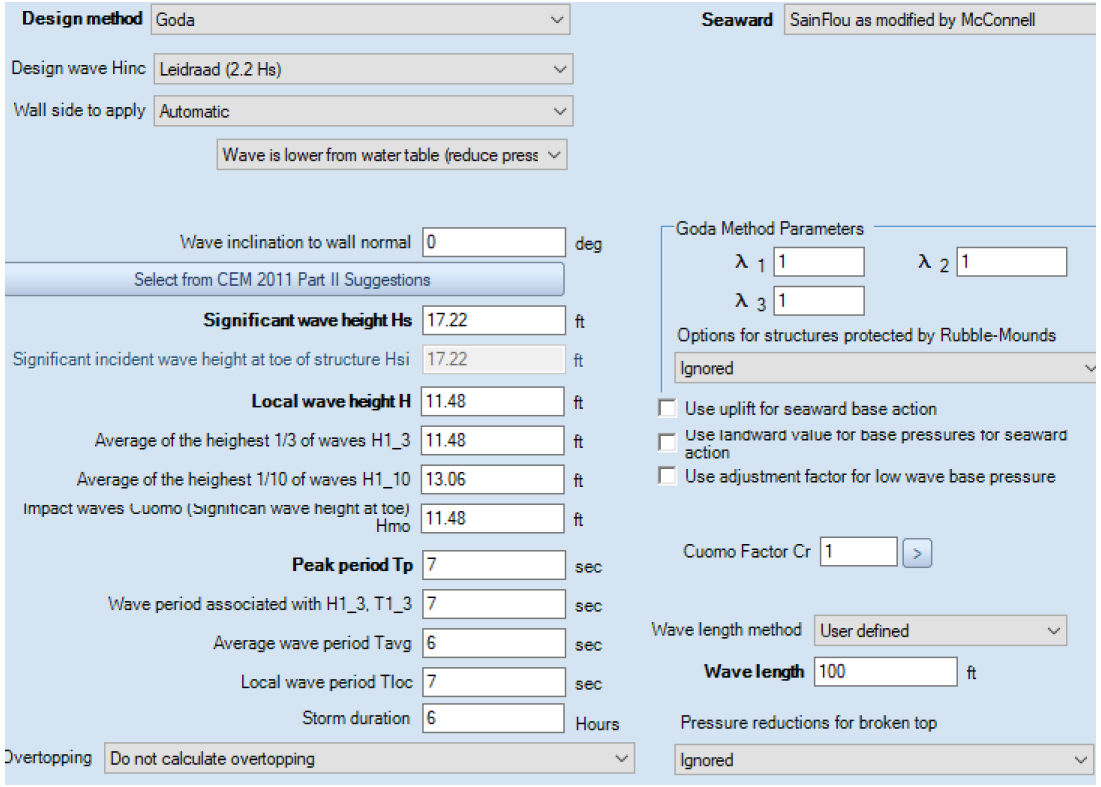
Use	P1	P2	Rebar	S(in)	No.	Clear(in)	Ast(in2)
☑	A	B	#9	6....	2	3	2
☑	B	C	#9	6....	2	3	2
☑	C	D	#9	6....	2	3	2
☑	D	E	#9	6....	2	3	2
☑	E	F	#9	6....	2	3	2
☑	F	G	#9	6....	2	3	2
☑	G	H	#9	6....	2	3	2
☑	H	A	#9	6....	2	3	2

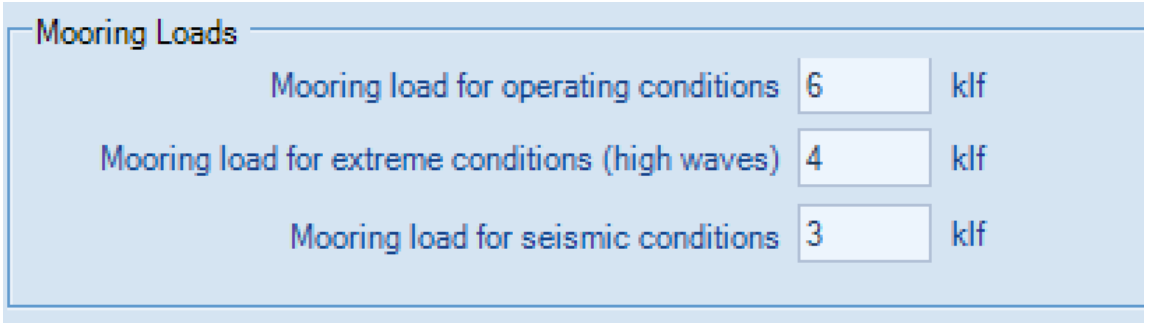


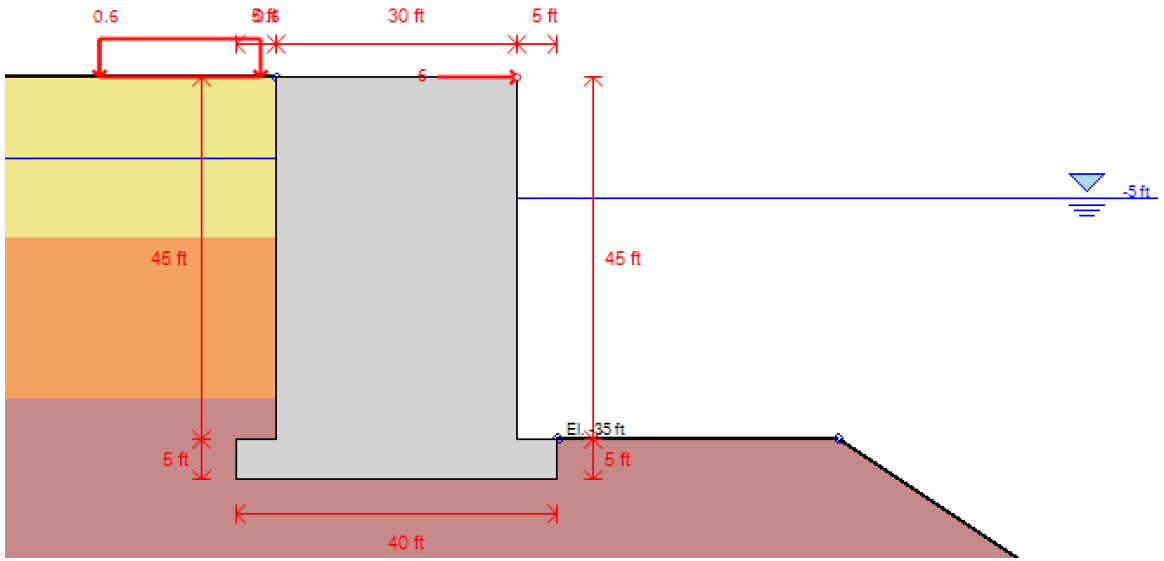
C. Wave Load Conditions & Mooring Loads

Wave Load Options

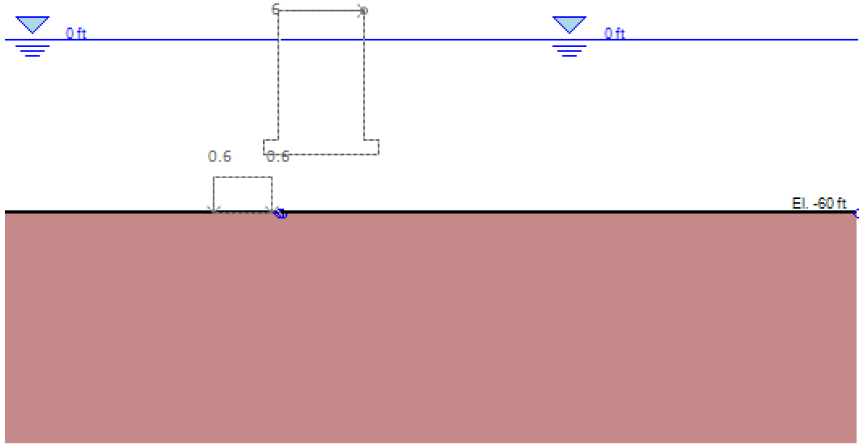
- Wave Pressures Method: Goda
- Critical Wave (CEM 2011): Tropical Depression
- Seaward: SainFlou as modified by McConnell



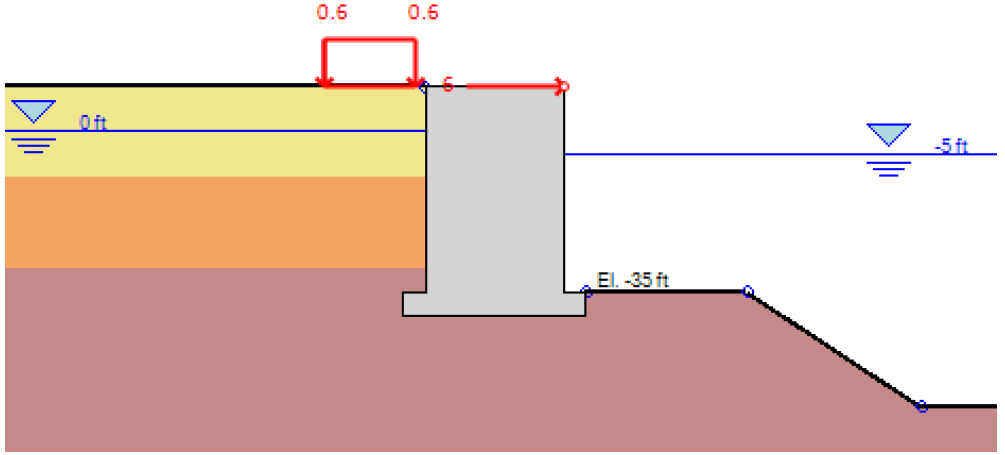




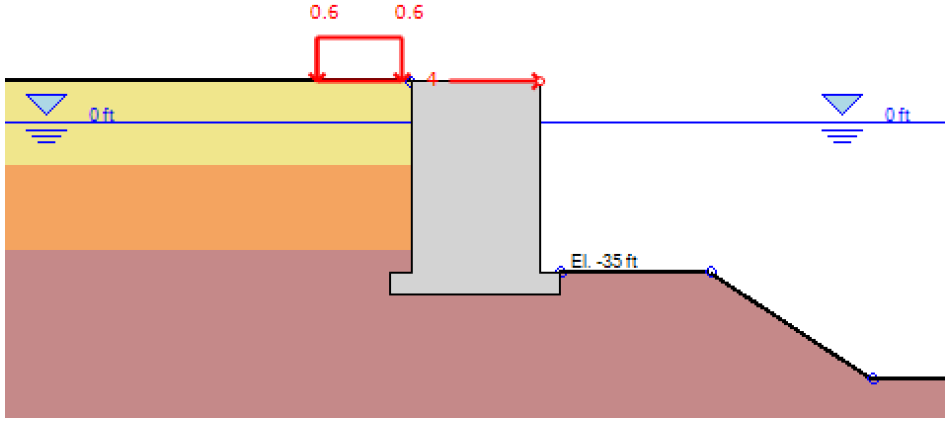
D. Model in Construction Stages



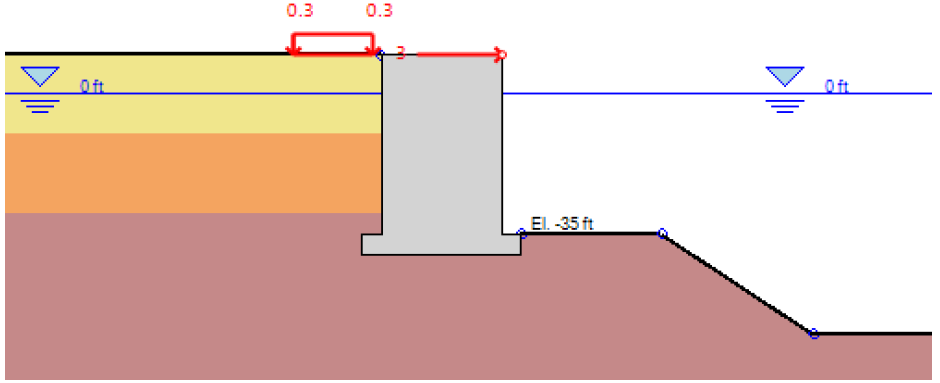
Stage 0: At-rest Conditions



Stage 1: Wall Installation & Backfill - Operating Conditions



Stage 2: Low Wave Conditions

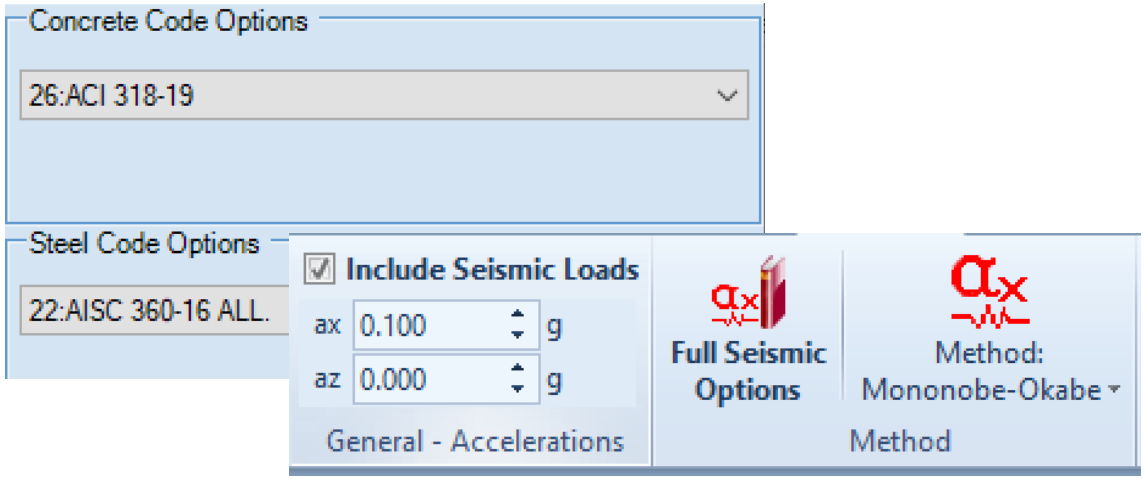


Stage 3: Seismic Conditions

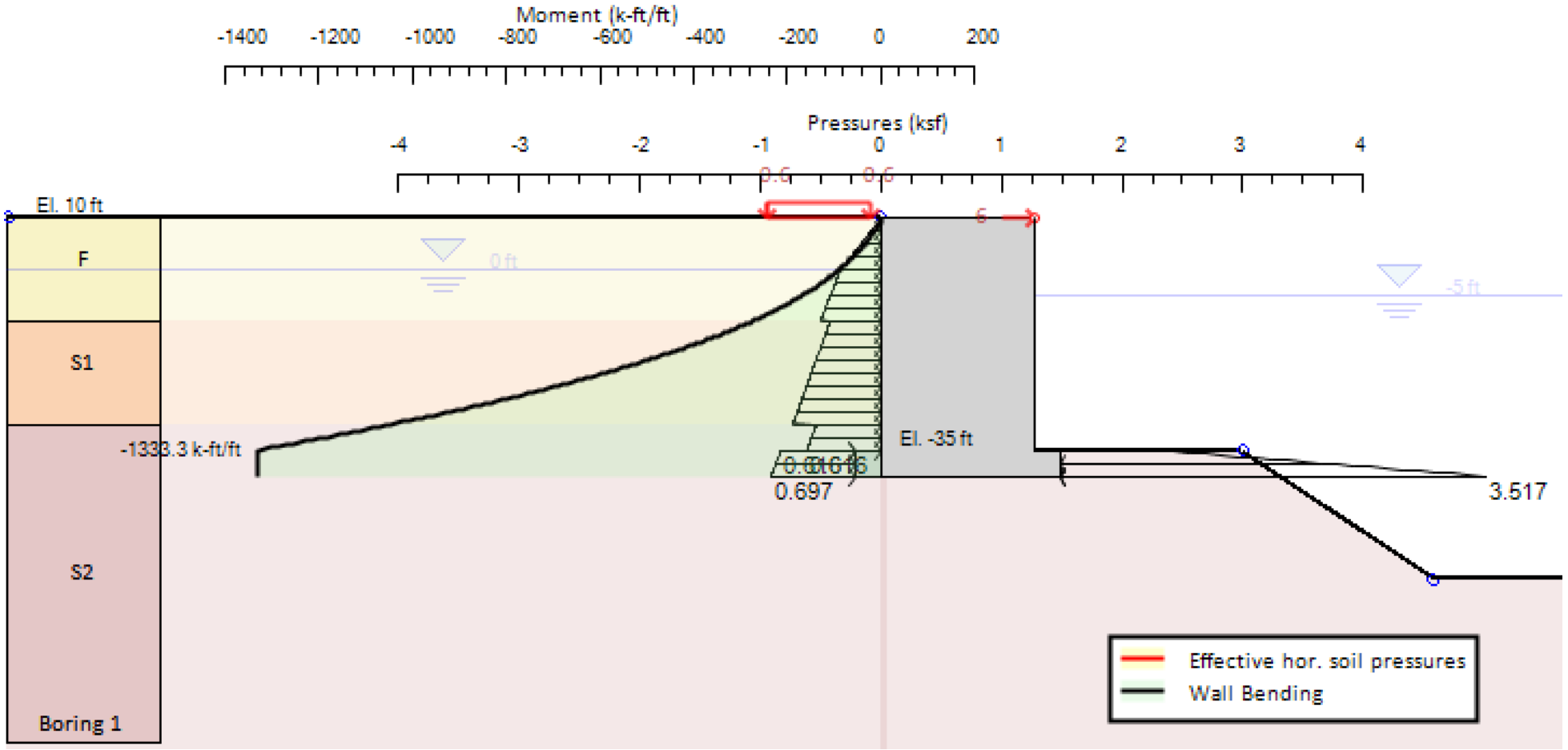
E. Analysis Settings & Design Codes

- Wall Friction: 66% of the soil friction
- Water Pressures: Simplified Flow
- Cantilever Method (LEM): Free Earth Method
- Soil Pressures: Active & Passive (All Stages)

- Steel Code: AISC 360-16 Allowable
- Concrete Code: ACI 318-19
- Analysis Code: None (Service Conditions)
- Seismic Pressures: Adesign = 0.1g (Stage 3)
- Seismic Pressures Method: Mononobe-Okabe

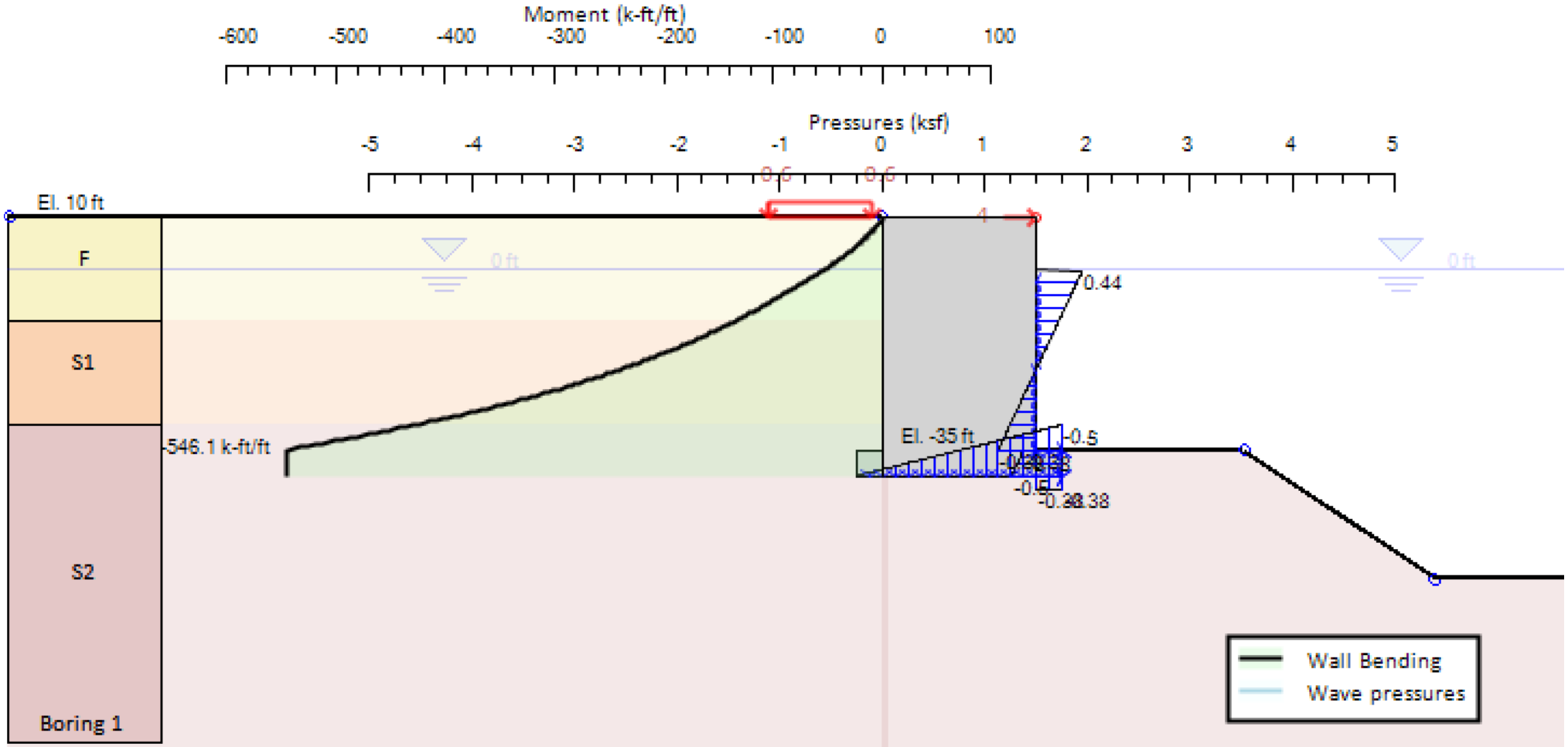


F1. LEM Analysis Results



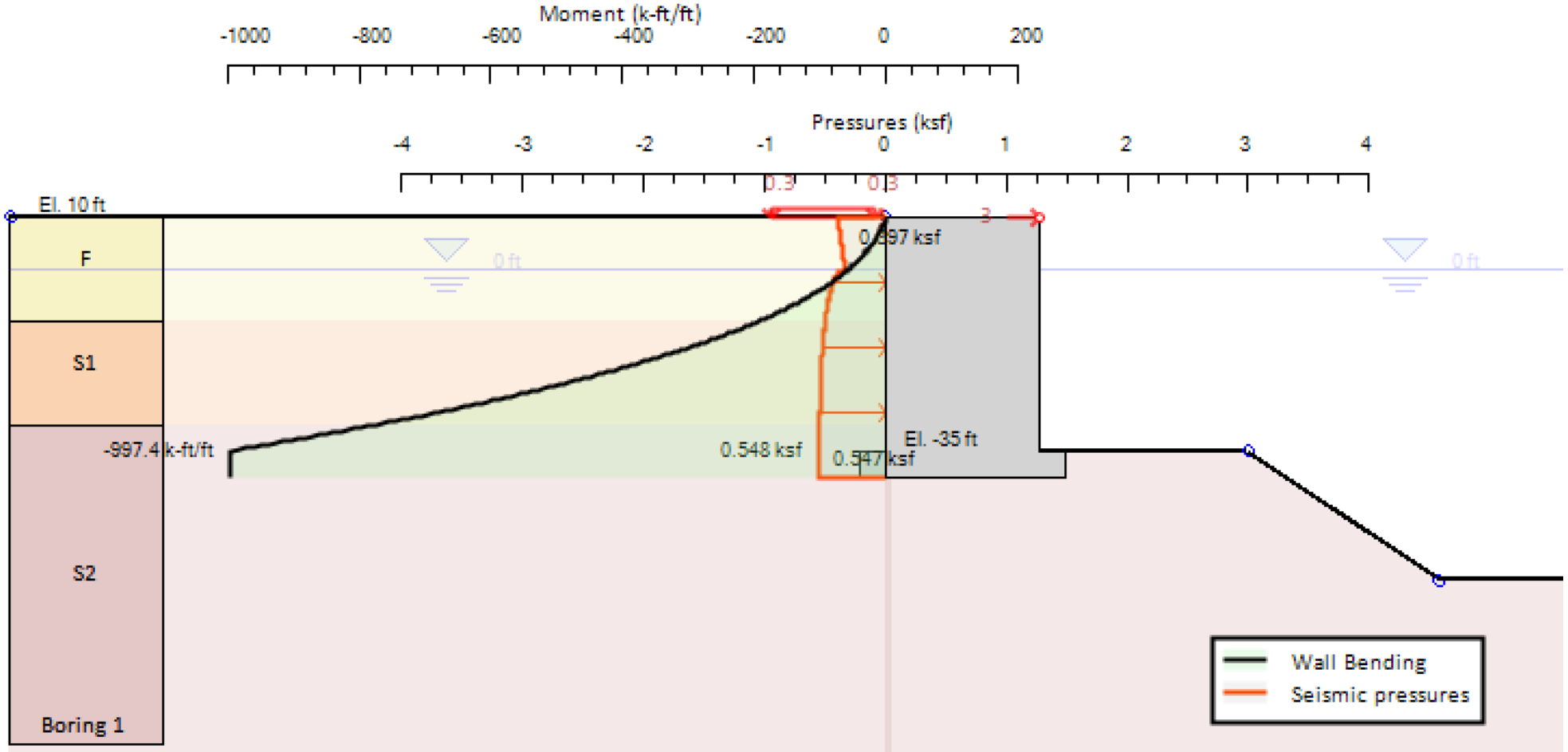
Wall Moment Diagram & Soil Pressures - Operating Conditions

F2. LEM Analysis Results



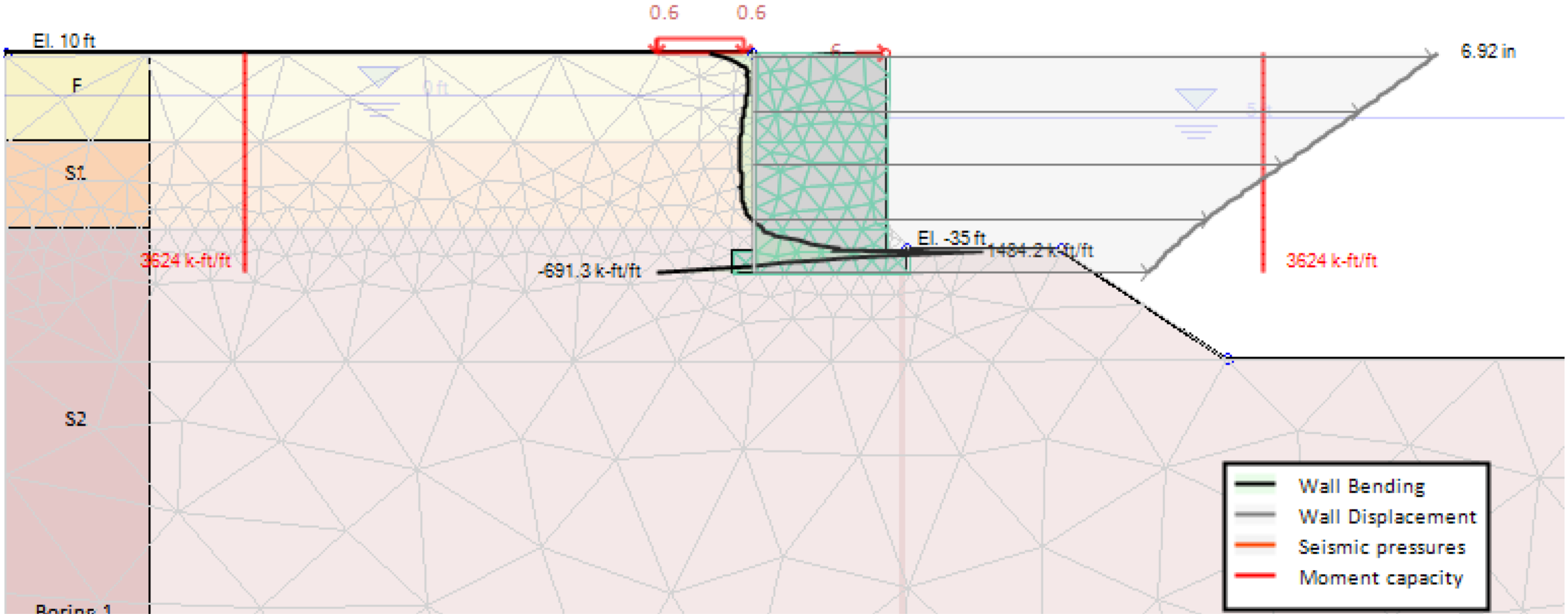
Wall Moment Diagram & Wave Pressures - Low Wave Conditions

F3. LEM Analysis Results



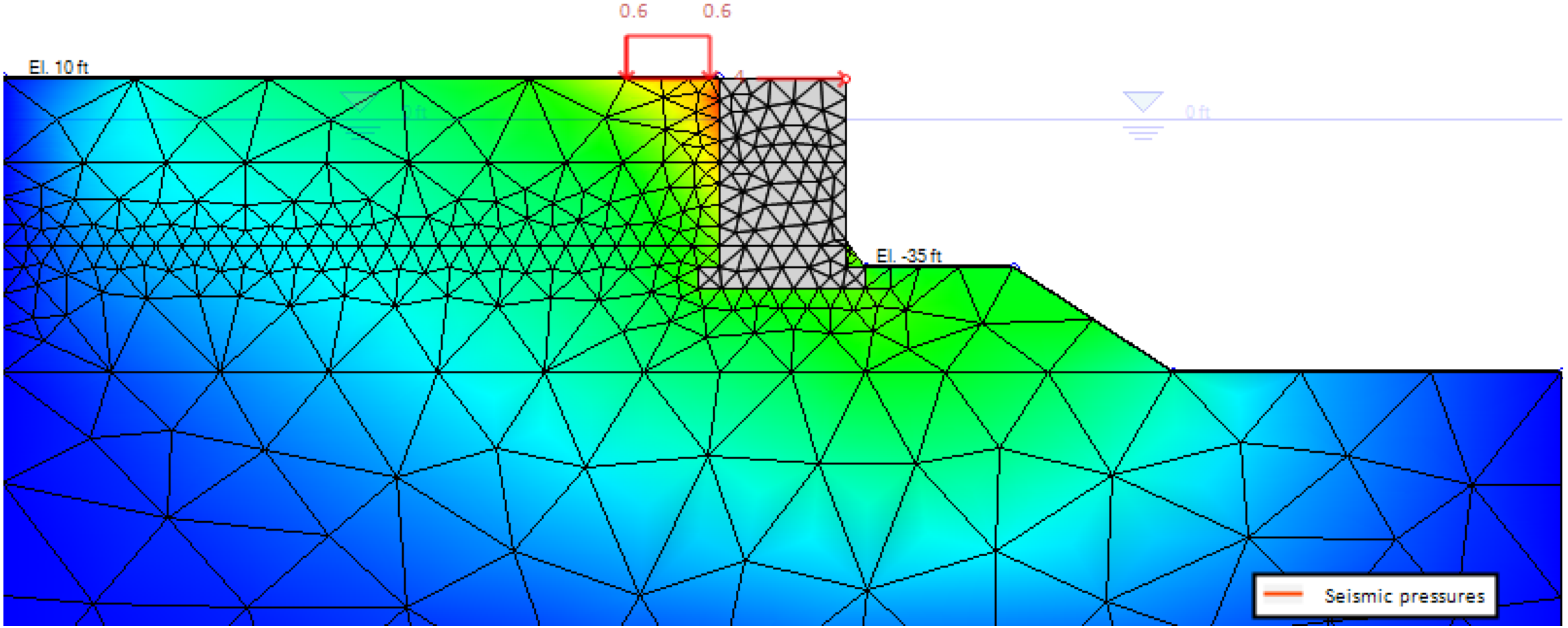
Wall Moment & Seismic Pressure Diagrams - Seismic Conditions

G1. FEM Analysis Results



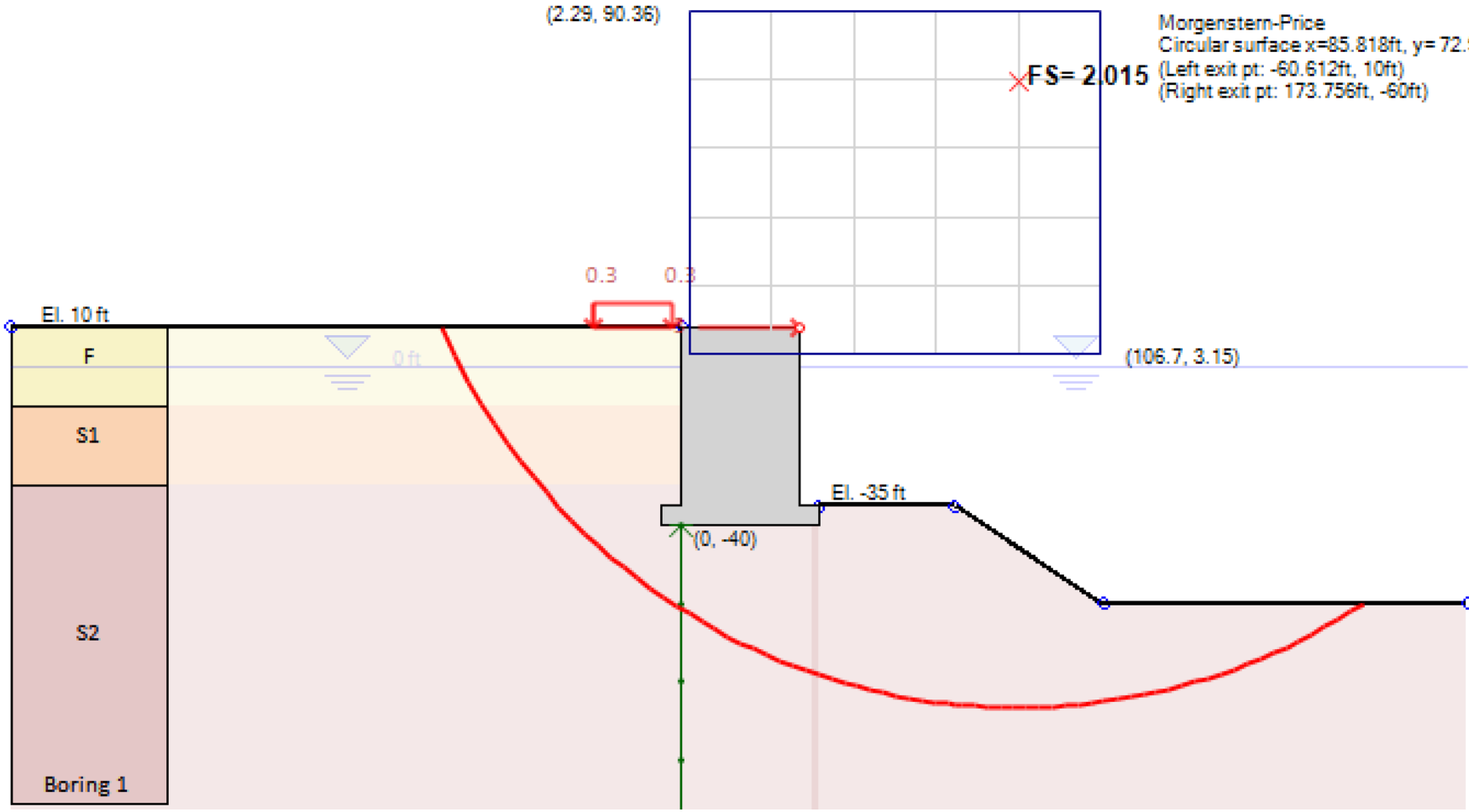
Wall Moment & Displacement Diagrams - Operating Conditions

G2. FEM Analysis Results



Generated FEM Mesh & Soil Displacement Shadings - Low Wave Conditions

H. Slope Stability Analysis Results



Critical Slope Surface (Circular) & Slope Stability Safety Factor

Thank You!

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