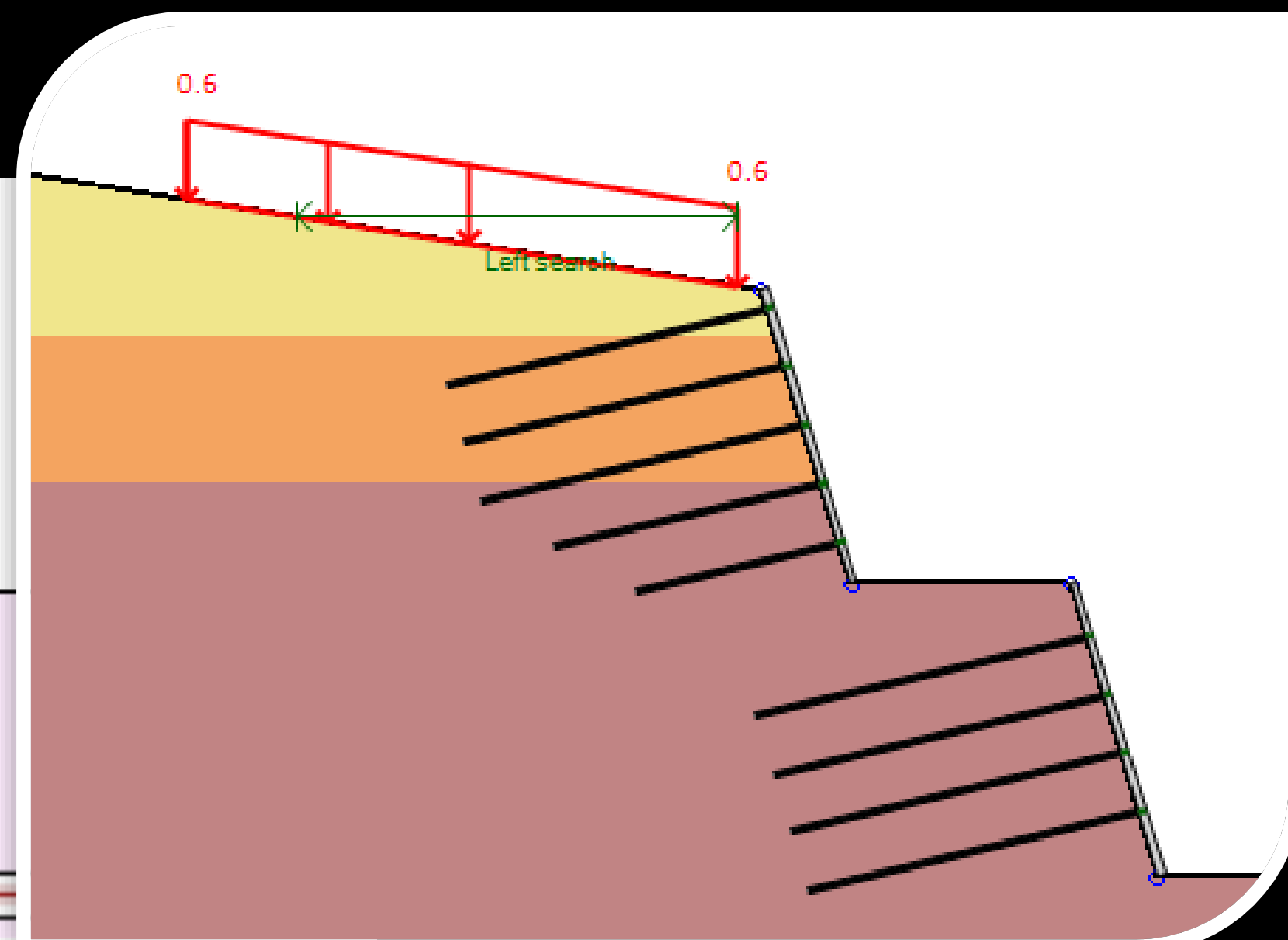
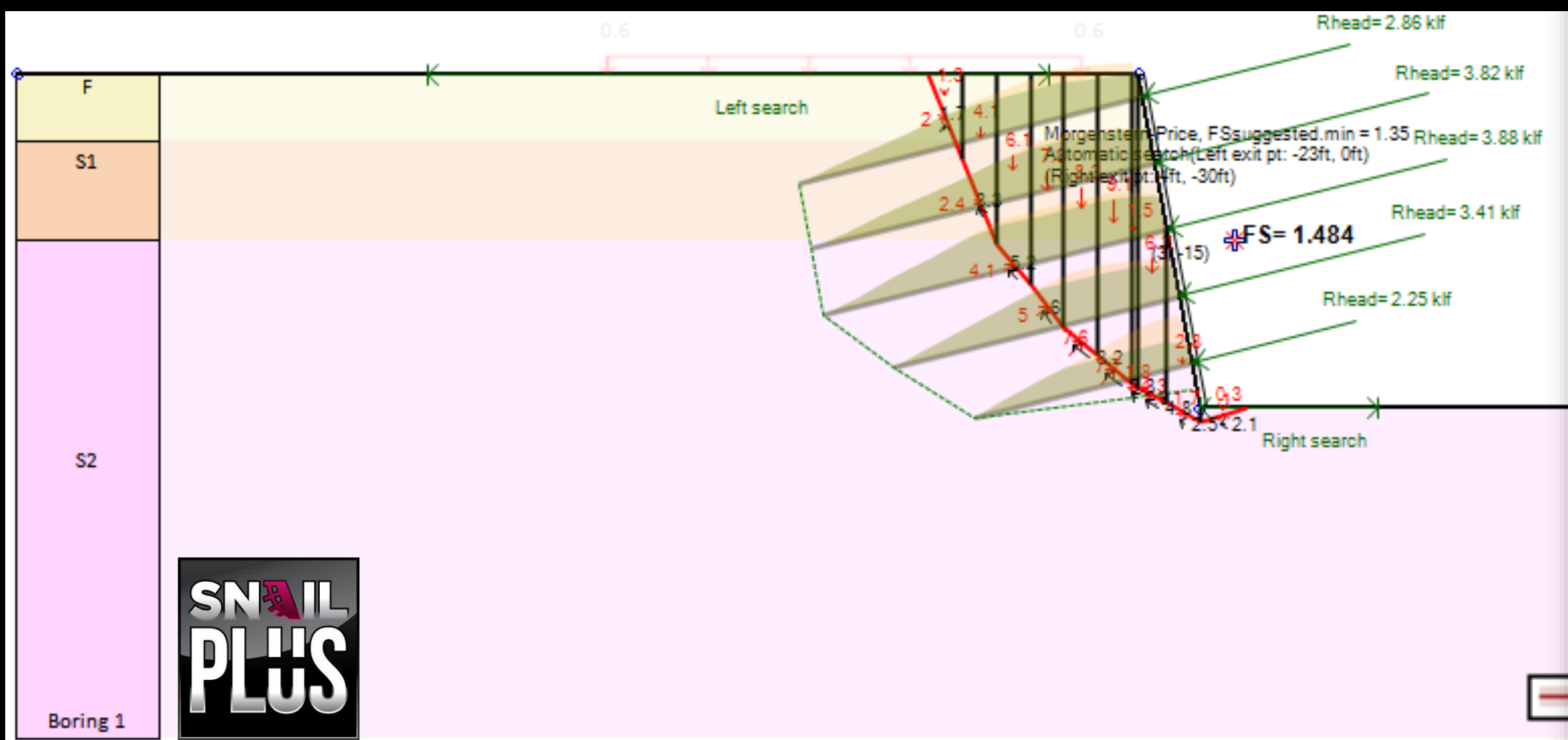


Design of Soil Nail Walls - Methods and Software Application

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- Consulting Services - Design of deep excavations and pile foundations
- Virtual Reality applications for geotechnical engineers and contractors



DeepEX



HoloDeepEX



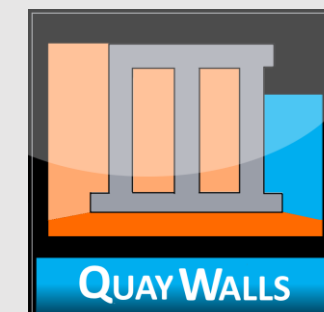
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SnailPlus - Slope Stability Analysis - Soil Nail Wall Design Software

SnailPlus Software Features and Analysis Methods

More information:

Click here to learn more:
[SnailPlus – Features and Capabilities
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Slope Stability Analysis and Design of any Soil Nail Wall System

Slope Stability Analysis

Slope Stability Analysis Methods:

- ✓ Bishop Method
- ✓ General Limit Equilibrium (Morgenstern-Price Method)
- ✓ Spencer Method

Critical Slope Surface Search Methods:

- ✓ Circular Surface
- ✓ Circular Surface with Active/Passive Wedges
- ✓ Block Type Failure
- ✓ Automatic Slope Search
- ✓ Tri-linear Slope Search
- ✓ User-Defined Slope Surface

Stage Conditions:

- ✓ Temporary Structure (short term)
- ✓ Permanent Structure (long term)
- ✓ Extreme Event (Seismic/High Water)

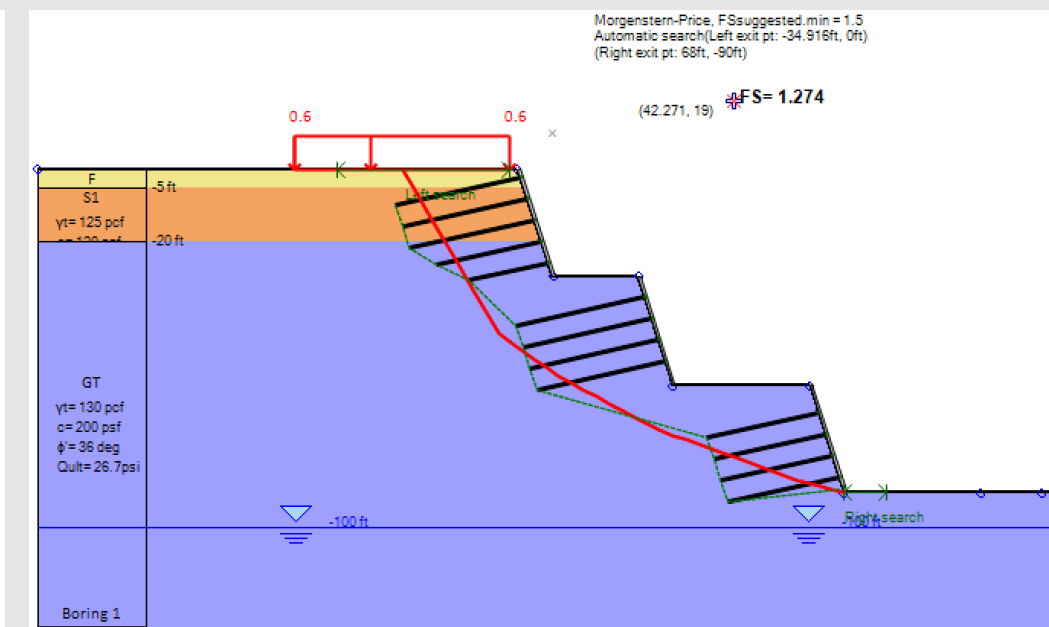
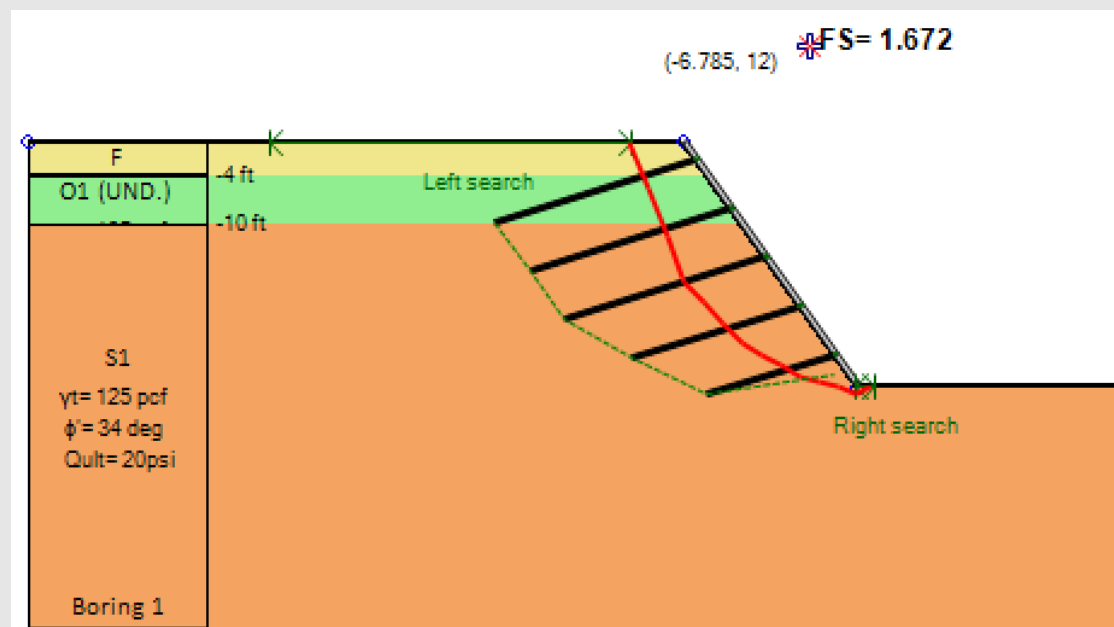
Soil Nail Walls Design

Soil Nails:

- ✓ Structural and Geotechnical Design
- ✓ French Clouterre Recommendations

Shotcrete Facing and Head Plates:

- ✓ Full structural design
- ✓ ACI and FHWA Methods
- ✓ Two-Stage Facing (Permanent & Temporary)



- ✓ Create multiply soil types and define soil properties
- ✓ Soil properties estimation tools (NSPT values - test data)
- ✓ Create multiple borings and define the horizontal stratigraphy
- ✓ Add CPT logs and SPT Records - Estimate properties from records
- ✓ Custom Layer mode: Create inclined soil layers

Soil Types

Soil Types: F, O1, O2, S1, V, GT, R

1. Name and Basic Soil Type
Soil Name: F Description: Miscellaneous fill

2. Soil Type - Behaviour
 Sand Silt Rock
 Clay IGM (intermediate geo mat.)

3. Default drained-undrained behavior for clays (See Theory Manual)
 Undrained Drained

4. Unit Weights - Density
 γ_t 120 pcf γ_{dry} 120 pcf

5. Strength Parameters and Poisson Ratio
 c' 0 psf ϕ' 30 degree
 S_u 0 psf ϕ_{cv} Omitted degree
 v 0.35 ϕ_{peak} Omitted degree

6. Permeability
 K_x 0.1 ft/sec K_z 0.1 ft/sec

8. At-rest coefficients
 K_{oNC} 0.5 n_{OCR} 0.5
 $K_o = K_{oNC} * (OCR)^{n_{OCR}}$

Buttons: Add New Soil, Copy Soil, Delete Selected Soil, Paste Soil, OK

Soil Layers

Available Borings: Boring 1

1. General Boring Information - Coordinates
 N Boring 1
 Coordinates X 50 ft Y 0 ft
 The x coordinate controls where the boring is shown in your design section view. Each design section uses one boring (soil strata). You can use a different boring on each design section.

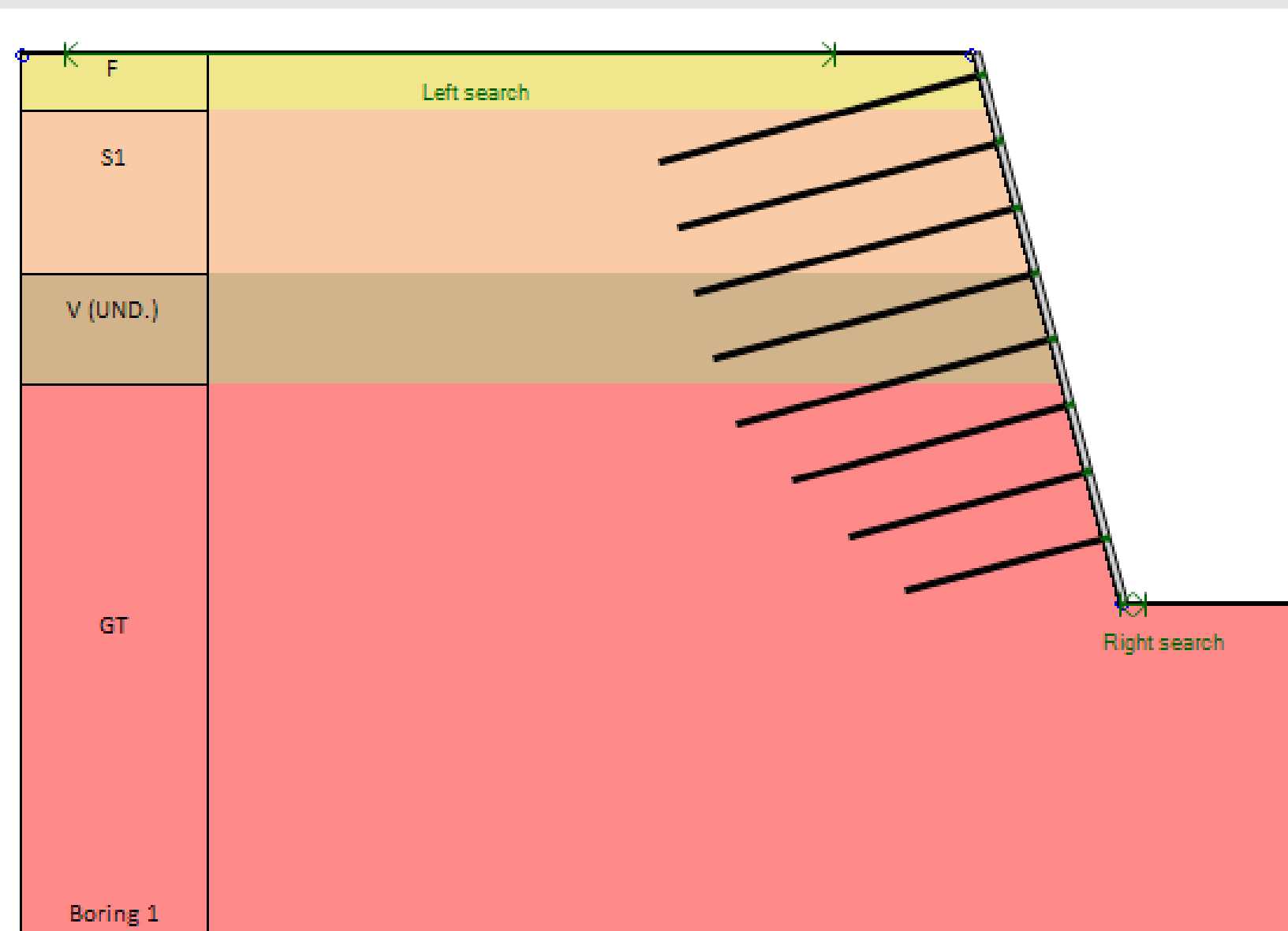
SPT Data Option (Applies to Design Section)
 SPT Record: Not assigned Add edit SPT records

CPT Record Option (Applies to Design Section)
 CPT Record: Not assigned Add edit CPT records

2. Boring Layers - Layer Elevations

	Top	Soil type	OCR	Ko	Edit
▶	20	F	1	0.5	Edit
	15	S1	1	0.4408...	Edit
	0	V	1	0.5305...	Edit
	-10	GT	1	0.412	Edit
*					

Buttons: Add New Boring, Delete Selected Boring (Stratigraphy), Clone Boring, Insert Layer, Delete Layer, OK, Cancel



- ✓ Use two-stage facing through stages (temporary-permanent)
- ✓ Define facing structural section (thickness, materials, reinforcement)
- ✓ Define the structural section for the headplates
- ✓ Draw additional facing/soil nail row configurations
- ✓ Select Stud sections

Slab Sections

Available Slabs: Slab 0, Slab 1, Slab 2

A. Section Properties | B. Advanced | C. Section Envelope

1. Name: Slab 0

2. Structural Materials

Concrete: 3 ksi Concrete, fck 3 ksi, E 3122.02 ksi

Rebar: Grade 60, fyk 60 ksi

Color: [Color Selection]

3. Section Dimensions: D 8 in, B 12 in

4. Longitudinal Slab Reinforcement

Vert. Front bars #: #6, Ctop 2 in, Space H 8 in

Hor. Front bars #: #6, Space V 8 in

Vert. Base bars #: #6, Cbot 2 in, Space H 8 in

Hor. Base bars #: #6, Space V 8 in

5. Shear Reinforcement: Bar# = As 0 in², sX 0 in, sY 0 in

Diagram: Top view showing dimensions D, B, Ctop, Cbot and reinforcement layout.

Buttons: Add New Slab Section, Delete Selected Slab Section, Recalculate Properties, OK, Cancel

Facing for soil nails (shotcrete or other)

A. Data | B. Results | C. Results for this stage | D. Advanced

1. Name: Soil nail facing

2. Facing type: Shotcrete (uses concrete slab sections)

Two stage facing (temporary and permanent)

Permanent facing this stage

Specify different temporary concrete

3. Slab section used for facing: Slab 0

4. Activate/Deactivate: Activate facing for this stage

5. Edit facing points: Edit

6. Options for staged excavation




Enable activation of individual stages


	Active	Bottom elevation
Stage 0	<input checked="" type="checkbox"/>	10
Stage 1	<input checked="" type="checkbox"/>	4
Stage 2	<input checked="" type="checkbox"/>	-2
Stage 3	<input checked="" type="checkbox"/>	-8
Stage 4	<input checked="" type="checkbox"/>	-14
Stage 5	<input checked="" type="checkbox"/>	-20
Stage 6	<input checked="" type="checkbox"/>	-26
Stage 7	<input checked="" type="checkbox"/>	-30
Stage 8	<input checked="" type="checkbox"/>	-30

Diagram: Staged excavation showing soil nail rows with spacing (sh=8in, sv=8in) and stage elevations.







Buttons: OK, Cancel

Analysis method

-  **BP Bishop** Bishop
-  **GLE M-P** General limit equilibrium (Moment-force)
-  **Spencer** Spencer

 **AUTO** Automatic search

User defined

-  Circular surface
-  Circular with active wedge
-  Circular with passive wedge
-  Circular with active and passive wedge
-  Block type failure
-  User defined surface

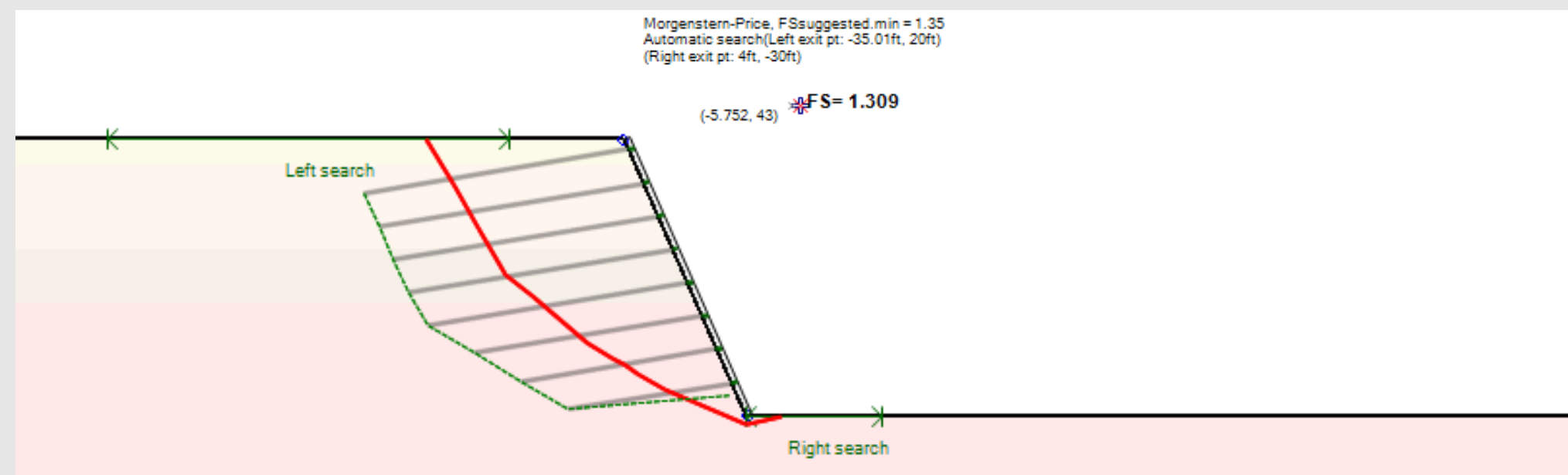
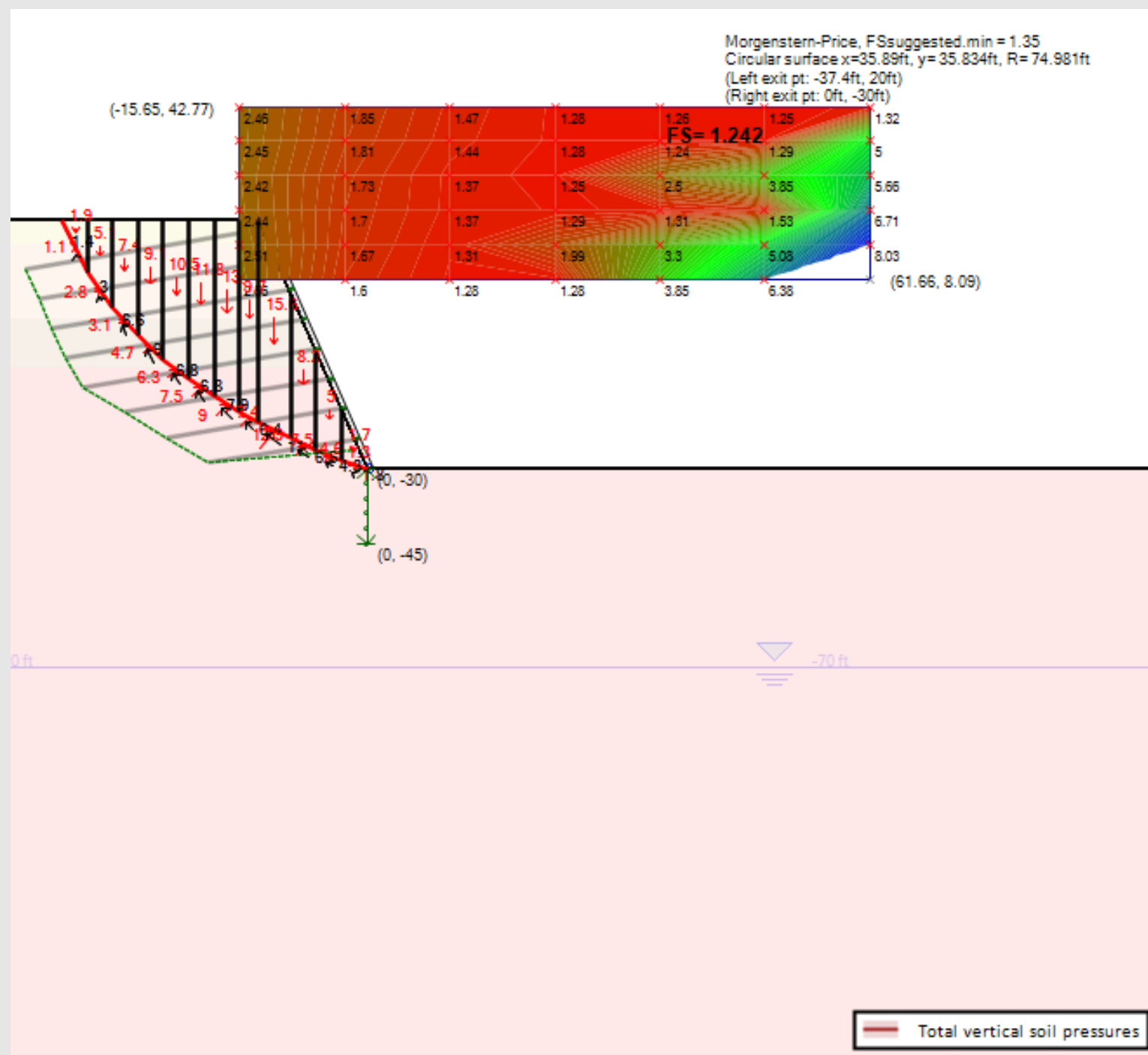
Pass critical surface to user surface

Slope Stability Analysis Methods:

- ✓ Bishop Method
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- ✓ Spencer Method

Critical Slope Surface Search Options:

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Facing for soil nails (shotcrete or other)

A. Data	B. Results	C. Results for this stage	D. Advanced
Lh (ft)	Lv (ft)	Mxx.Nail(B) (k-ft/ft)	Mxx.Span((k-ft/ft)
0	6	10	-0.235
1	6	8	-0.538
2	6	8	-0.958
3	6	8	-1.216
4	6	8	-1.446
5	6	8	-1.687
6	6	8	-1.965
7	6	6	-2.142
8	6	6	-2.142

Soil Nails:

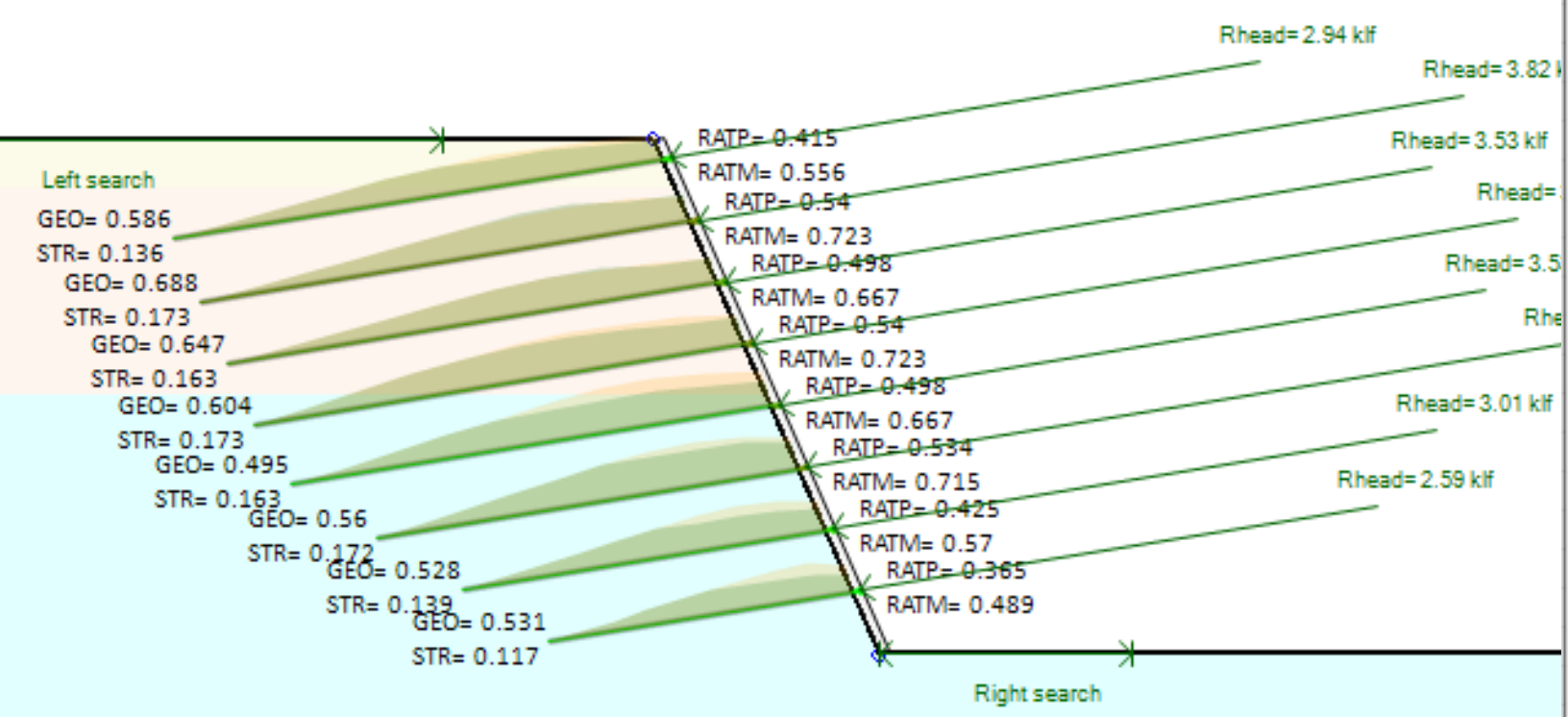
- ✓ Structural and geotechnical design
- ✓ French Clouterre recommendations
- ✓ Design of each soil nail row for the most critical load

Shotcrete Facing and Head Plates:

- ✓ Full structural design
- ✓ ACI and FHWA methods
- ✓ Moment and shear checks for the facings
- ✓ Moment and punching shear checks for the head plates

Edit soil nail

A. General	B. Results	C. Detailed results	C. Envelope
4. Results for all stages			
Units	Tension	Max. tension stab. analysis	Force at head Po
0: Exc.	34.37	36.48	4.2
1: Exc.	30.69	35.89	5.19
2: Exc.	26.39	33.99	7.89
3: Exc.	22.38	33	10.02
4: Exc.	16.78	31.1	11.92
5: Exc.	12.53	30.11	13.9
6: Exc.	6.97	27.93	16.19
7: Final	11.81	26.68	17.65
8: Stage	4.79	39.09	17.65



THANK YOU!

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