DeepEX
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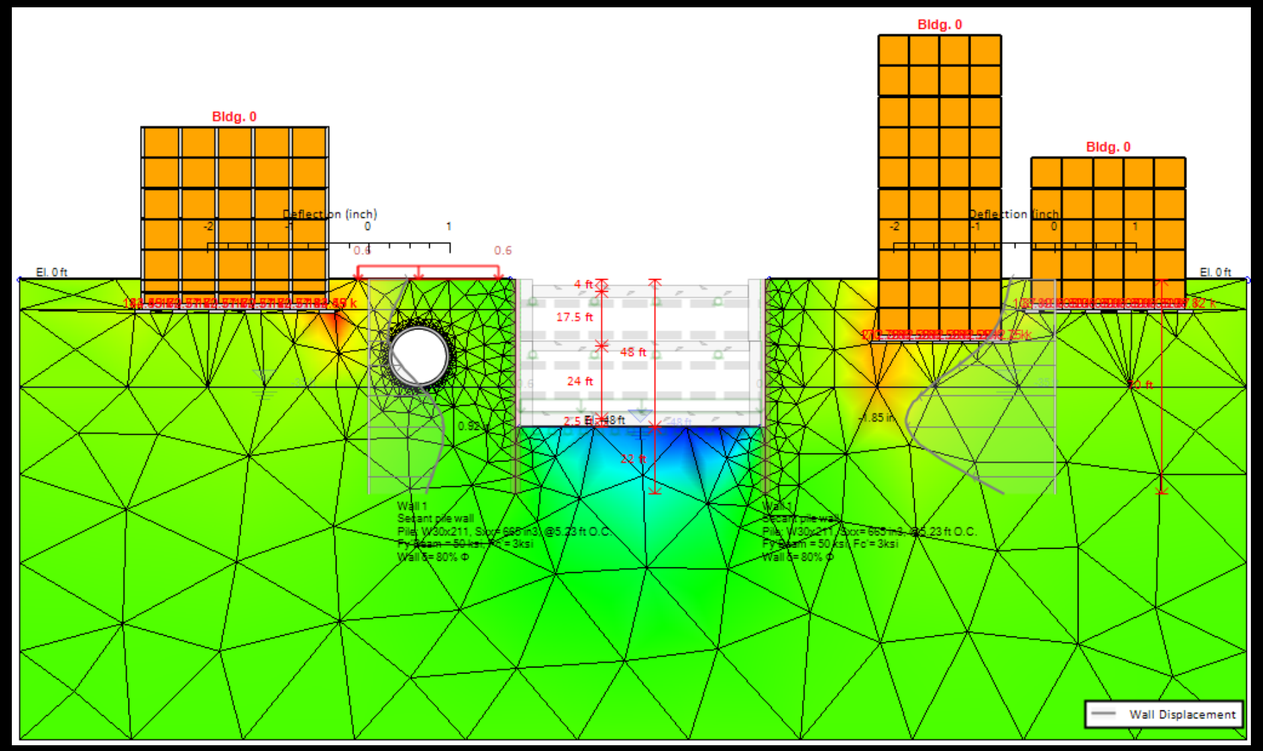
DEEP EXCAVATION
GEOTECHNICAL SOFTWARE & SOLUTIONS

Design of Deep Excavations & Tunnels
DeepEX Software Application

Presentation: Dimitrios Mamoglou, Dipl. Ing, EU P.E.
Senior Engineer Deep Excavation LLC
E: mamoglou@deepexcavation.com T: +1-917-472-9728



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Our Company

Deep Excavation LLC
240 W 35th Street, Suite 1004
New York, NY, 10001, USA

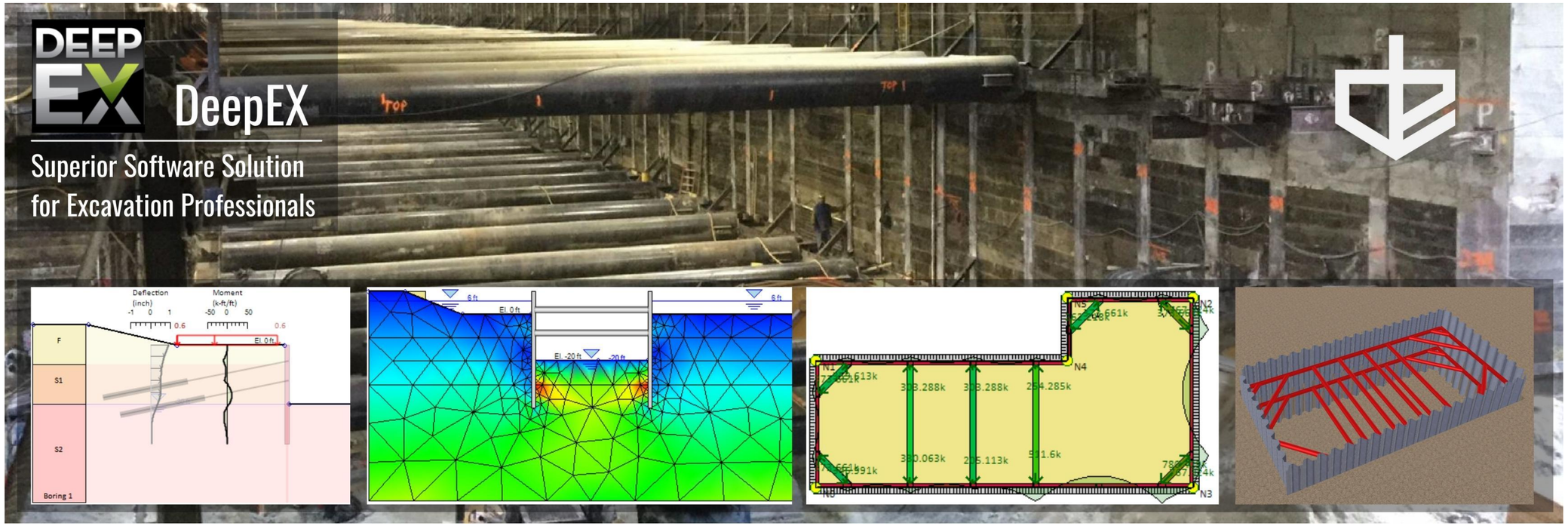
Websites:
www.deepexcavation.com
www.deepex.com

Contact Information:
sales@deepexcavation.com
training@deepexcavation.com

- ✓ Software solutions for excavation and foundation professionals
- ✓ Consulting Services - Design of deep excavations and pile foundations
- ✓ Virtual Reality applications for geotechnical engineers and contractors

DEEP EX
HOLODEEP EX
DEEP FND
HELIX PILE
SNAIL PLUS
QUAY WALLS
SITE MASTER
TRENCH
PILE D/R
DEVIATE VR
GeoBase.io
RCsolver
SteelBeam
WickDrains

DeepEX Features & Capabilities



Access deepexcavation.com
DeepEX Features & Capabilities

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DeepEX Software Versions & Modules

Version: DeepEX 2D

- ✓ Design & Analysis of 2D Cut Sections with All Stages
- ✓ All Common Wall Types & Support Systems
- ✓ Limit Equilibrium & Non-Linear Analysis
- ✓ Slope Stability Analysis
- ✓ Model Optimization
- ✓ Soil Estimation – Statistical Analysis
- ✓ Export Sketches to DXF (2D Sections, Wall Section Details)
- ✓ Export Reports to PDF & Word

Version: DeepEX 3D

- ✓ All DeepEX 2D Package Capabilities
- ✓ Generate & Design 3D Models with Struts & Walers
- ✓ Generate & Design 3D Models with Ground Anchors
- ✓ Project Cost Estimation
- ✓ Check Steel Connections
- ✓ Export 3D Model Holograms
- ✓ Import Buildings & Site Map from Google
- ✓ Perform Building Damage Assessment
- ✓ 2D Finite Element Analysis

Version: DeepEX 3D City

- ✓ All DeepEX 2D & 3D Package Capabilities
- ✓ Finite Element Analysis Method (2D & 3D FEM)
- ✓ Design Tunnels & Utility Lines
- ✓ Define your Subway Alignment & Tunnel Sections
- ✓ Perform Transportation Analysis
- ✓ Design all Metro Stations
- ✓ Estimate Settlements from Soil Loss & Consolidation
- ✓ Perform Damage Assessment for all Affected Buildings
- ✓ Export Sketches to DXF (Sections – Plan View – Details)
- ✓ Soil Estimation – Statistical Analysis
- ✓ Design Gravity Walls – Pile Abutments – Sea Walls
- ✓ Include Soil Reinforcements, MSE, Embankments
- ✓ Integration with Monitoring Data

Optional Module, Available to be added in **All Packages**: Gravity Walls/Pile Abutments/Sea Walls/MSE
Optional Module, Available to be added in the **DeepEX 2D** Package: 2D Finite Element Analysis
Optional Modules, Available to be added in the **DeepEX 3D** Package: Integration with Monitoring Data, 3D Finite Element Analysis

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DeepEX Software - General Capabilities

Full Structural and Geotechnical Design of any Deep Excavation Model

Wall Types in DeepEX

- ✓ Soldier Pile and Lagging Walls
- ✓ Sheet Pile Walls
- ✓ Secant / Tangent Pile Walls
- ✓ Concrete Diaphragm Walls (Slurry Walls)
- ✓ Soldier Pile and Tremied Concrete Walls
- ✓ Combined Sheet Pile Walls (King Piles)
- ✓ Box Sheet Pile Walls
- ✓ Custom Walls

Support Systems in DeepEX

- ✓ Anchored Walls (Tiebacks and Helical Anchors)
- ✓ Braced Excavations (Steel Struts and Rakers)
- ✓ Top/Down Excavations with Concrete Slabs
- ✓ Dead-man Walls
- ✓ Bin-Type Walls
- ✓ Cofferdams
- ✓ Circular Shafts
- ✓ Cantilever Walls

ANALYSIS METHODS: LIMIT EQUILIBRIUM ANALYSIS

Soil Pressures: Active/Passive, At-rest, Apparent Pressures (FHWA, Peck, Adaptive, Custom Trapezoidal +more)

Beam Analysis: Blum's, FHWA Simple Span, CALTRANS +more

NON-LINEAR ANALYSIS (SOIL SPRINGS)

Moments and Reactions from Spring Analysis

Cumulative Results from Stages

Realistic Displacements

FINITE ELEMENT ANALYSIS

Moments and Reactions from Finite Elements

Full Soil-Structure Interaction

Calculate Surface Settlements

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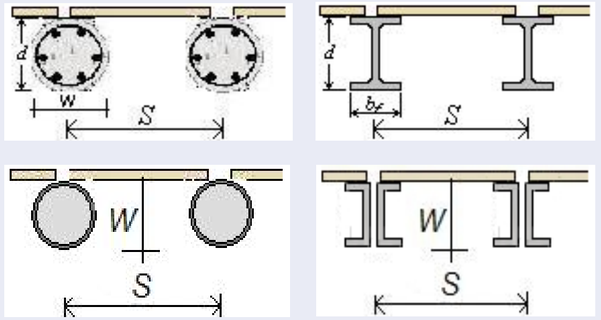
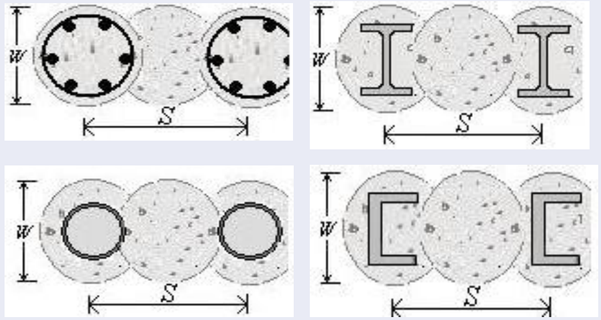
Common Wall Types in DeepEX

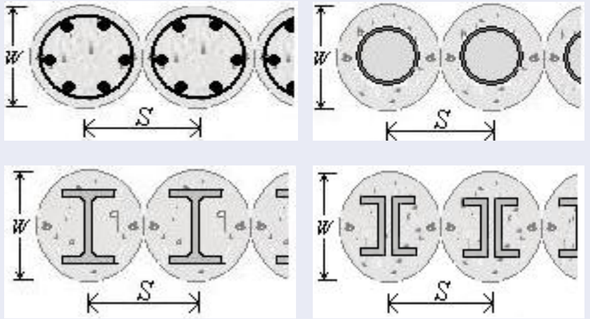
Soldier pile and lagging walls



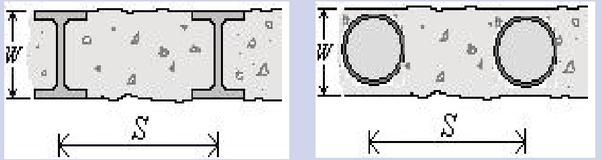
Secant pile walls



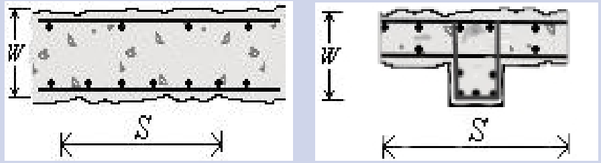
Tangent pile walls



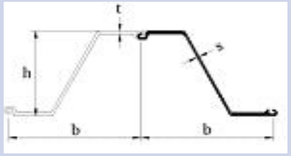
SPTC walls



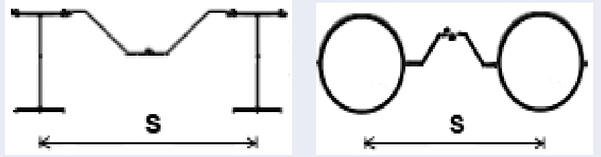
Diaphragm (slurry) walls



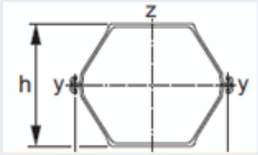
Sheet pile walls



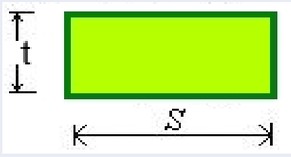
Combined sheet pile walls



Box sheet pile walls



Custom walls



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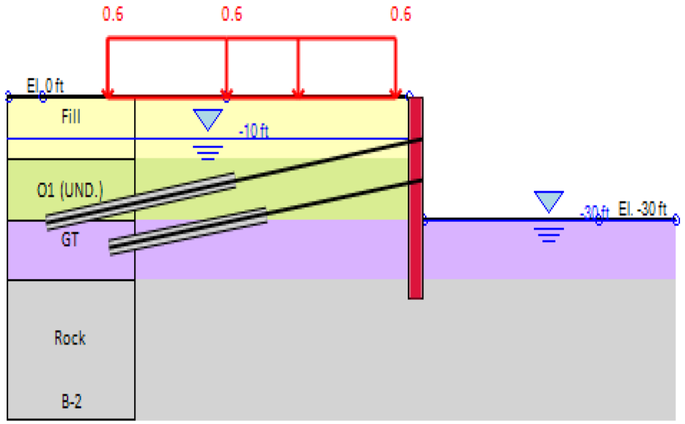
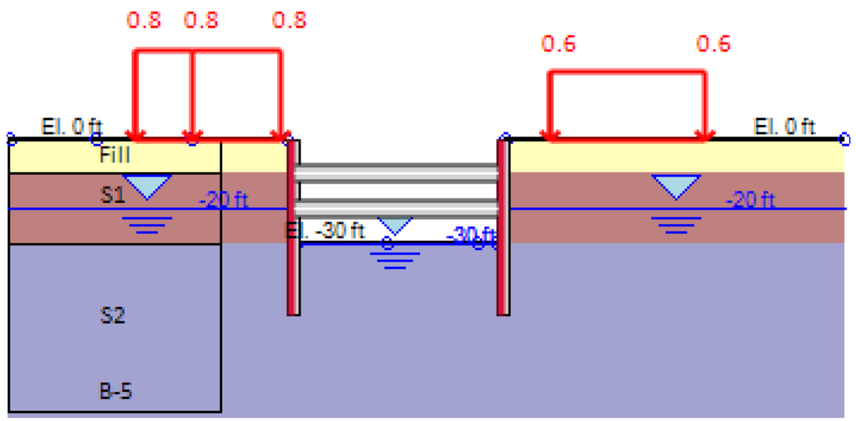
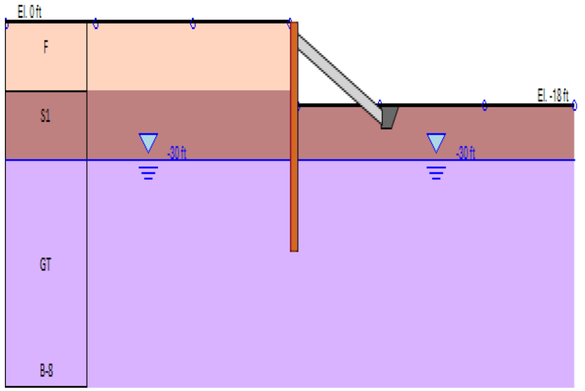
Support Systems in DeepEX

Anchored Walls (Tiebacks)

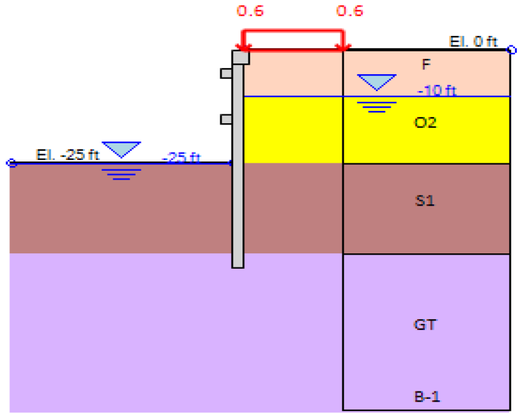


Braced Excavations (Struts and Rakers)

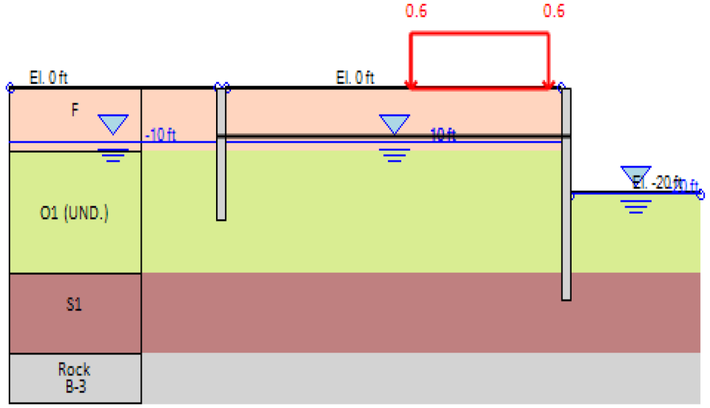




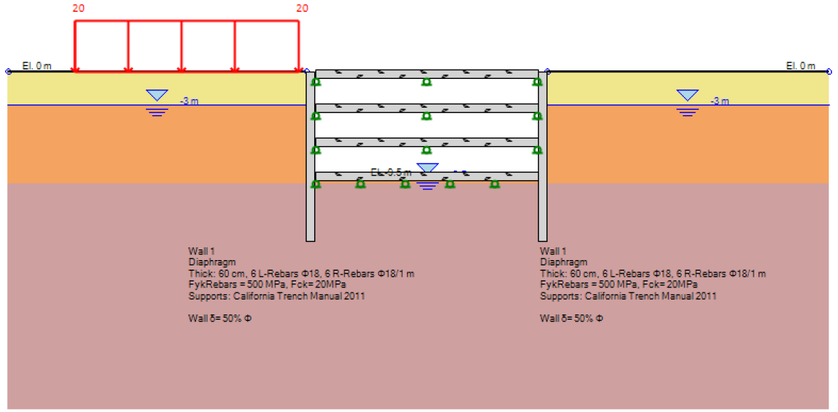
Circular Shafts (Ring Beams)



Dead-man Walls (Tierods)



Top-Down Excavations (Concrete Slabs)



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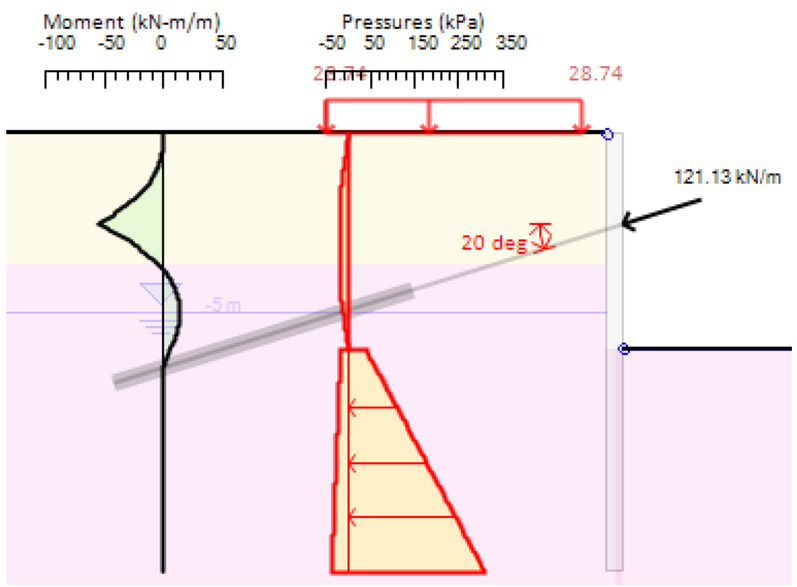
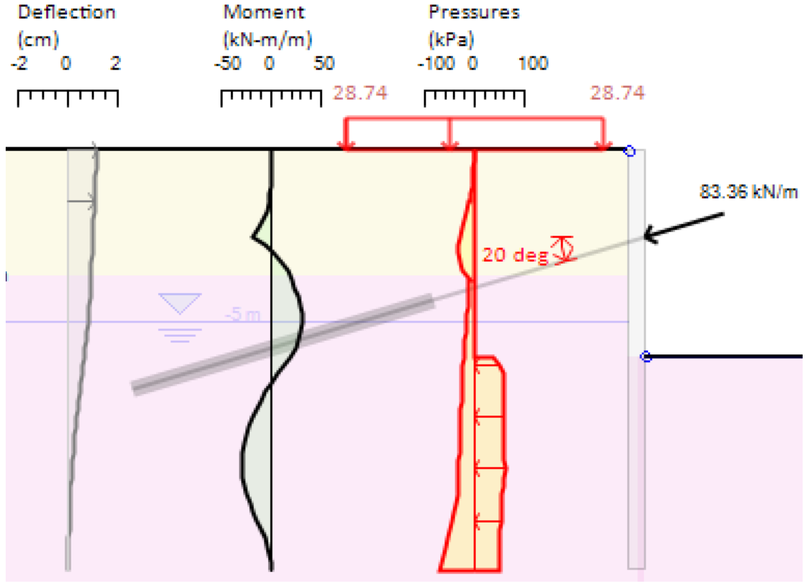
Multiple Analysis Methods

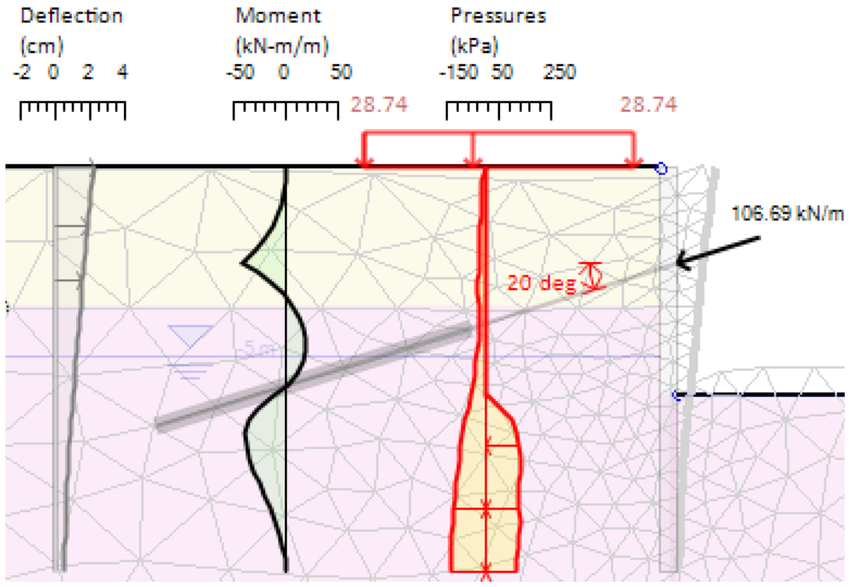
Limit Equilibrium Analysis (LEM)



Non-Linear Analysis (NL) (Elastoplastic Springs)



Finite Element Analysis (FEM)*



*The 2D FEM module is optional in DeepEX 2D Version, included in DeepEX 3D and 3D City packages

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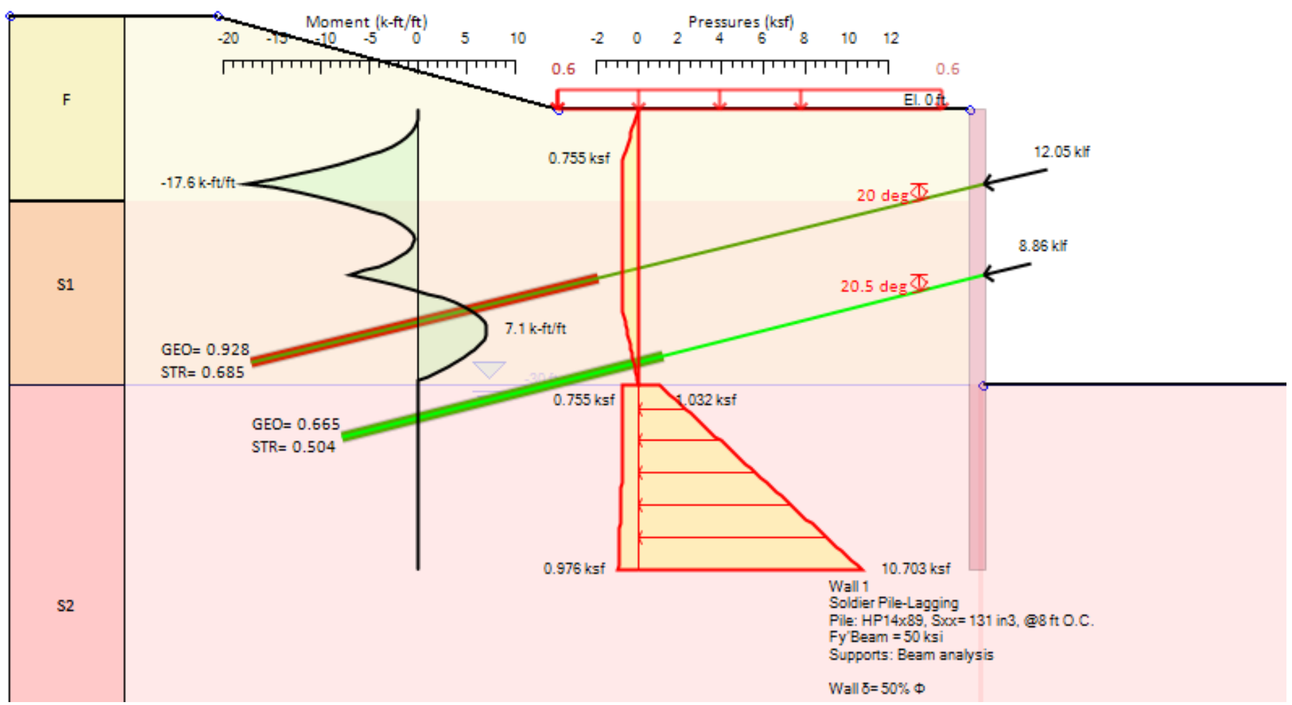
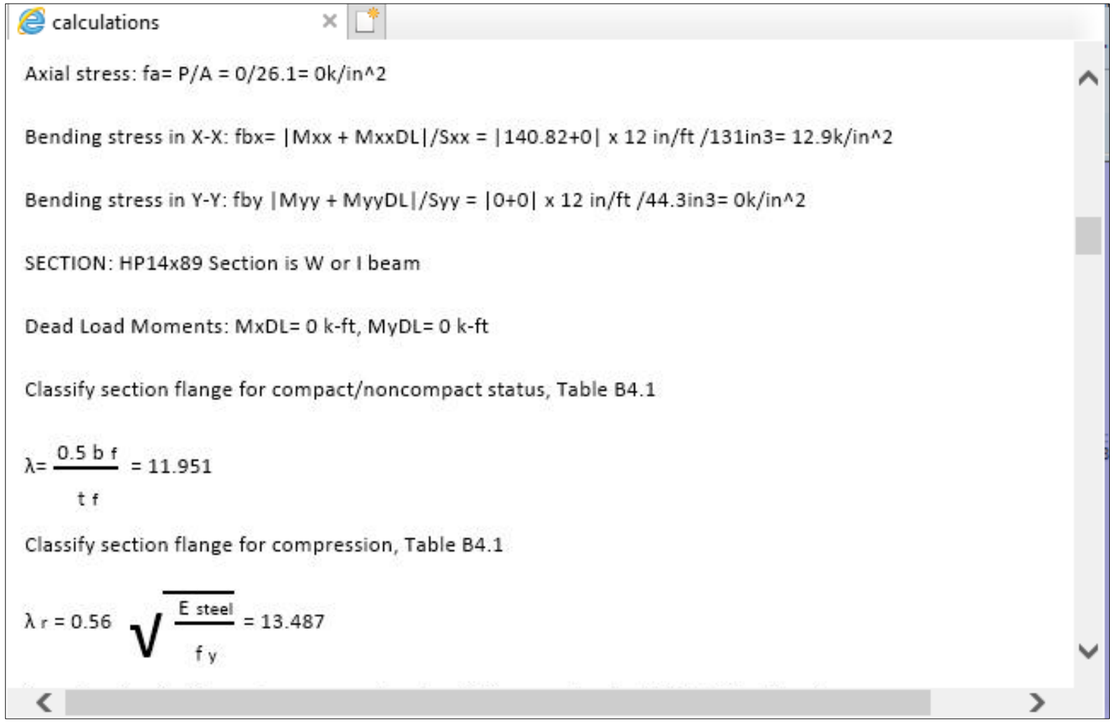
Structural & Geotechnical Design

Diagrams, Reactions & Check Ratios:



Structural Checks & Design Calculations:



Structural Codes: Eurocodes 1,2 & 8, ACI, LRFD, AISC, AS 3600 & 4100, CN (China), CSA, IS + more

Design Standards: Eurocode 7, DIN, BS, XP, AASHTO LRFD, CALTRANS, CN (China), CAN + more

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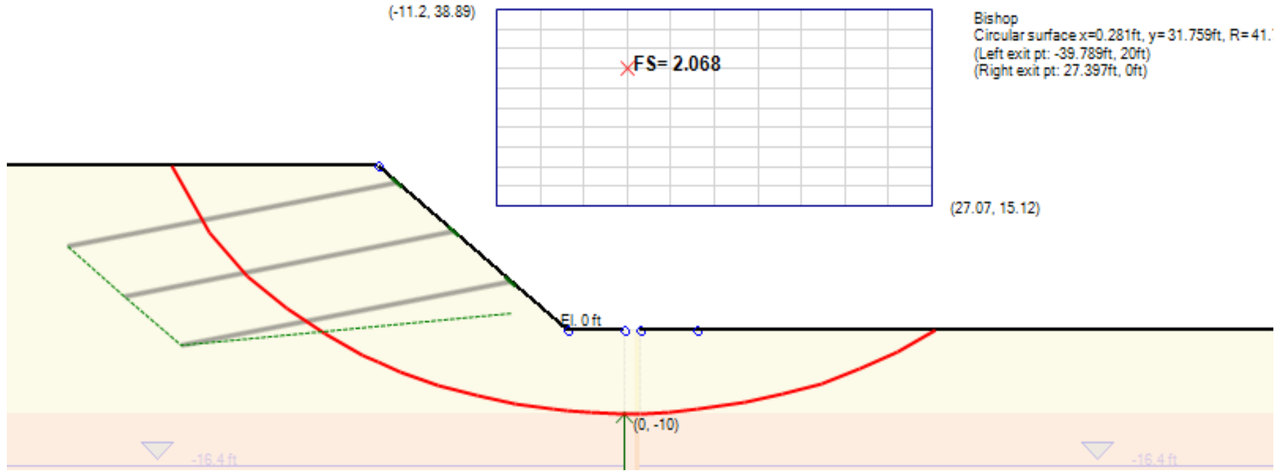
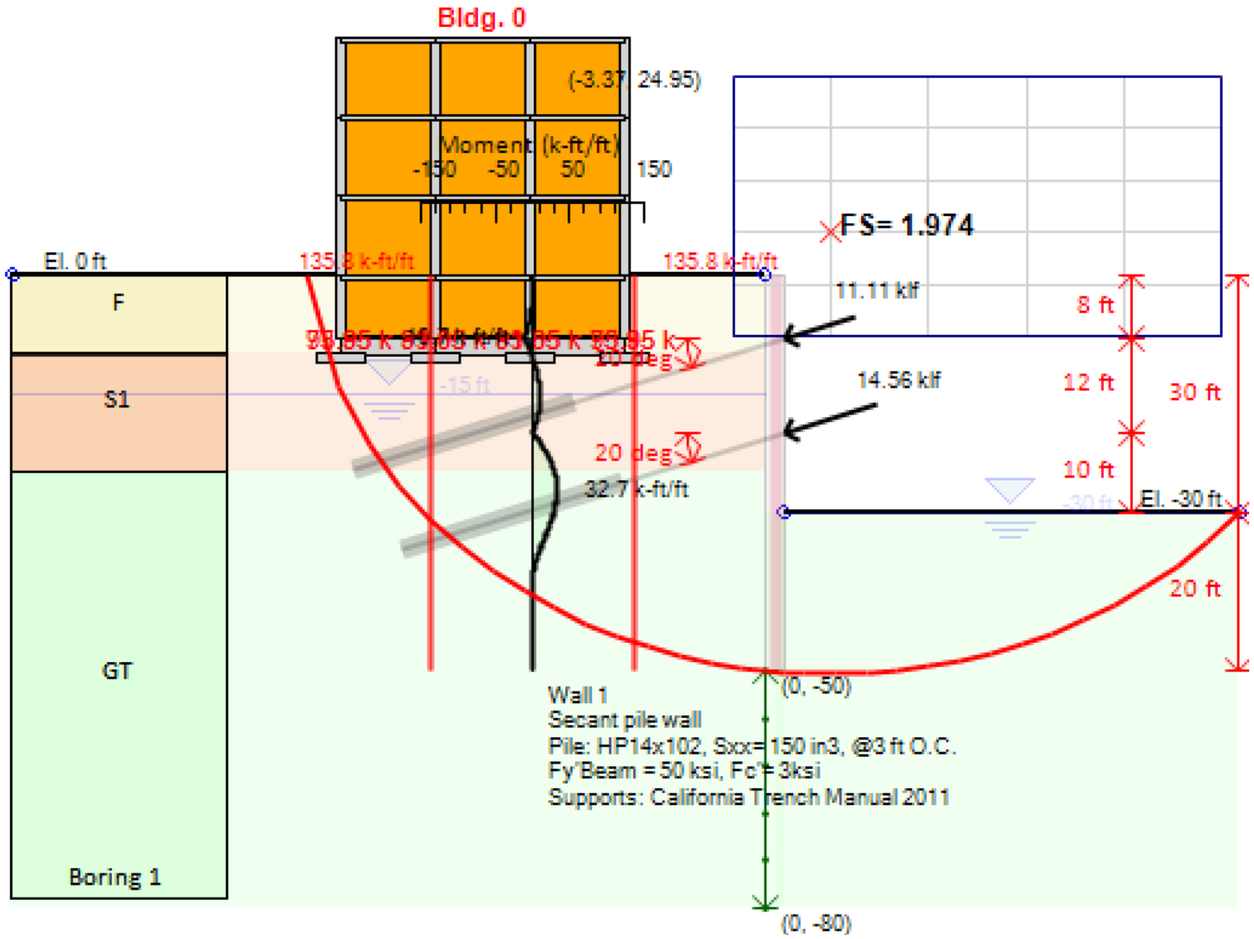
Slope Stability Analysis Options



- ✓ Bishop Method
- ✓ Morgenstern Price Method (G.L.E.)
- ✓ Spencer Method
- ✓ Ordinary (Swedish) Method
- ✓ Automatic Slope Search Method
- ✓ Single Point Slope Center
- ✓ Rectangular Slope Center
- ✓ Define Radius Search Limits
- ✓ Clouterre Standards for Soil Nails



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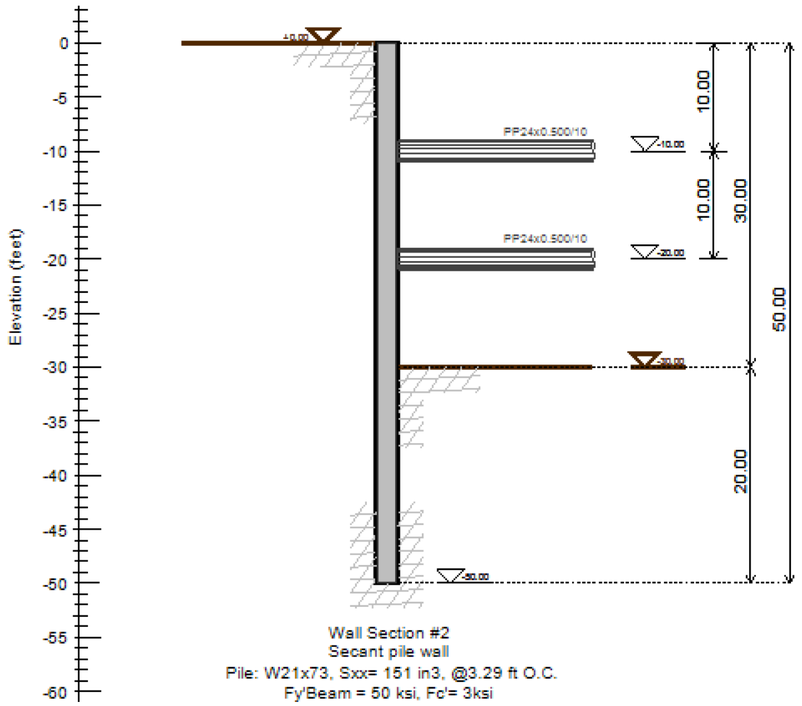
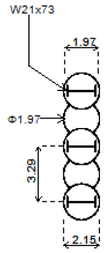
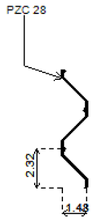
Export All Project Sketches to DXF

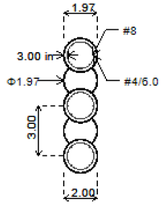




Wall Section #2
Secant pile wall
Pile: W21x73, Sxx= 151 in3, @3.29 ft O.C.
Fy'Beam = 50 ksi, Fc'= 3ksi



Wall Section #3
Steel Sheets
DES: PZC 28, Sxx= 51.2 in3/ft
Fy'Sheet = 50 ksi



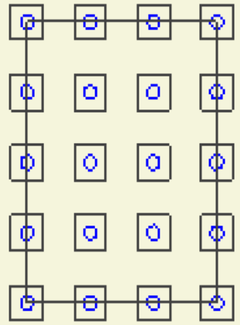
Wall Section #4
Secant pile wall: Reinforced intesecting concrete piles (alternating)
Pile Diam: 24 in, 8 Rebars #8, @3 ft O.C.
Fy'Rebars = 60 ksi, Fc'= 3ksi

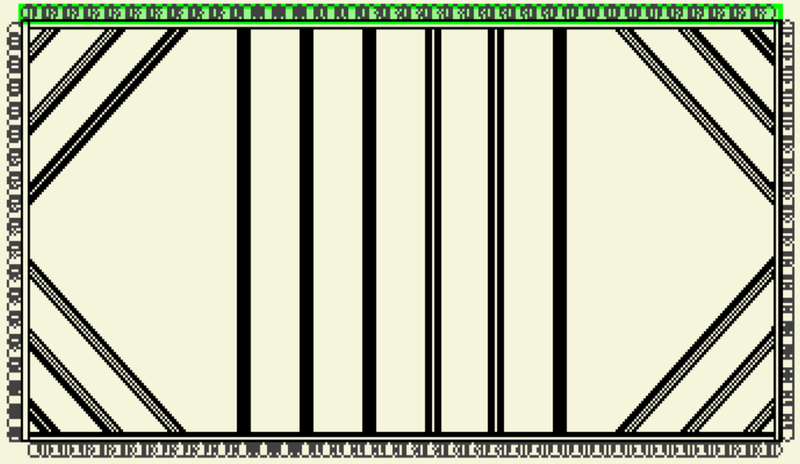
2D Sections:

- ✓ Export all 2D Sections Sketches for each Construction Stage
- ✓ Export Wall Section Details
- ✓ Export 2D Sections with Result Diagrams

3D Models:

- ✓ Export all 2D Sections and Wall Details
- ✓ Export Full Project Plan Sketches
- ✓ Export Elevation Sketches for each Project Wall





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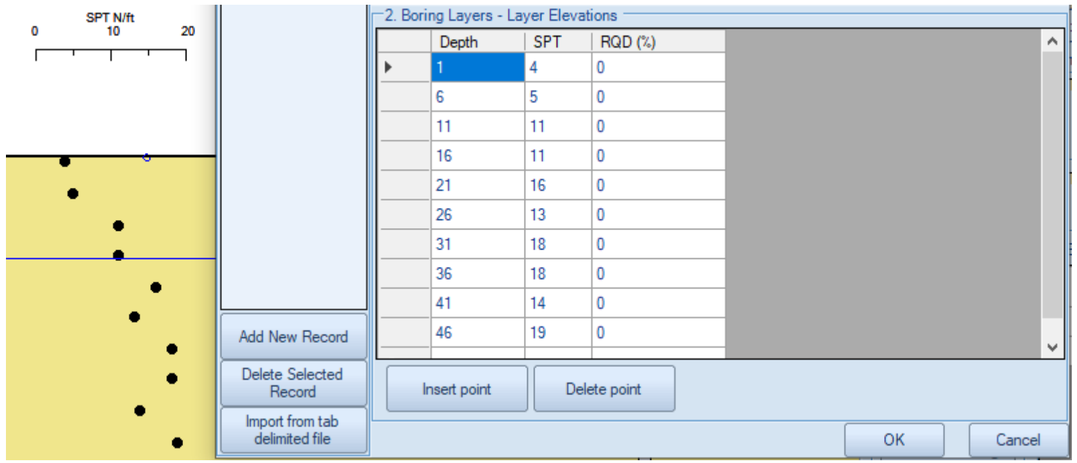
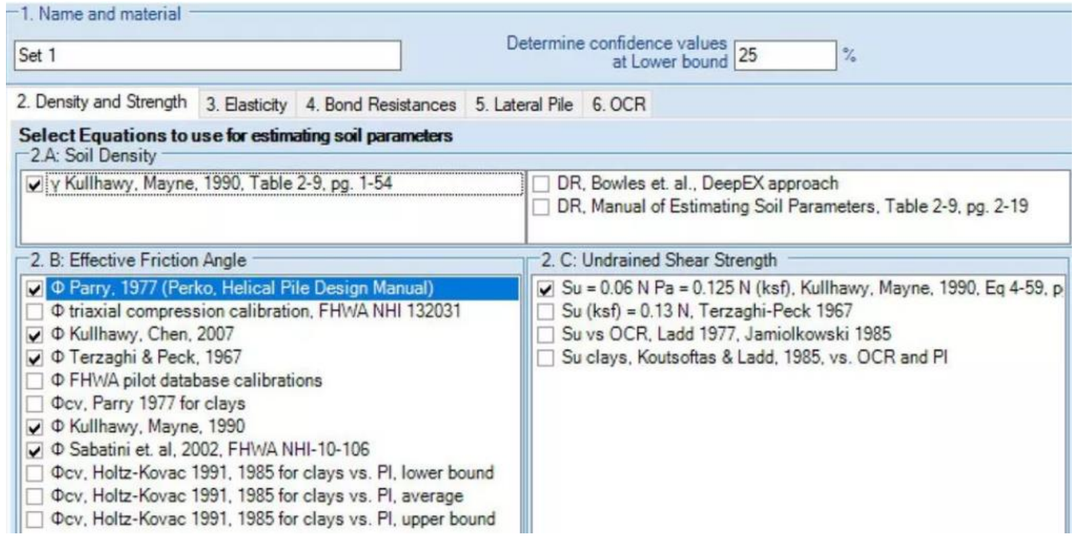
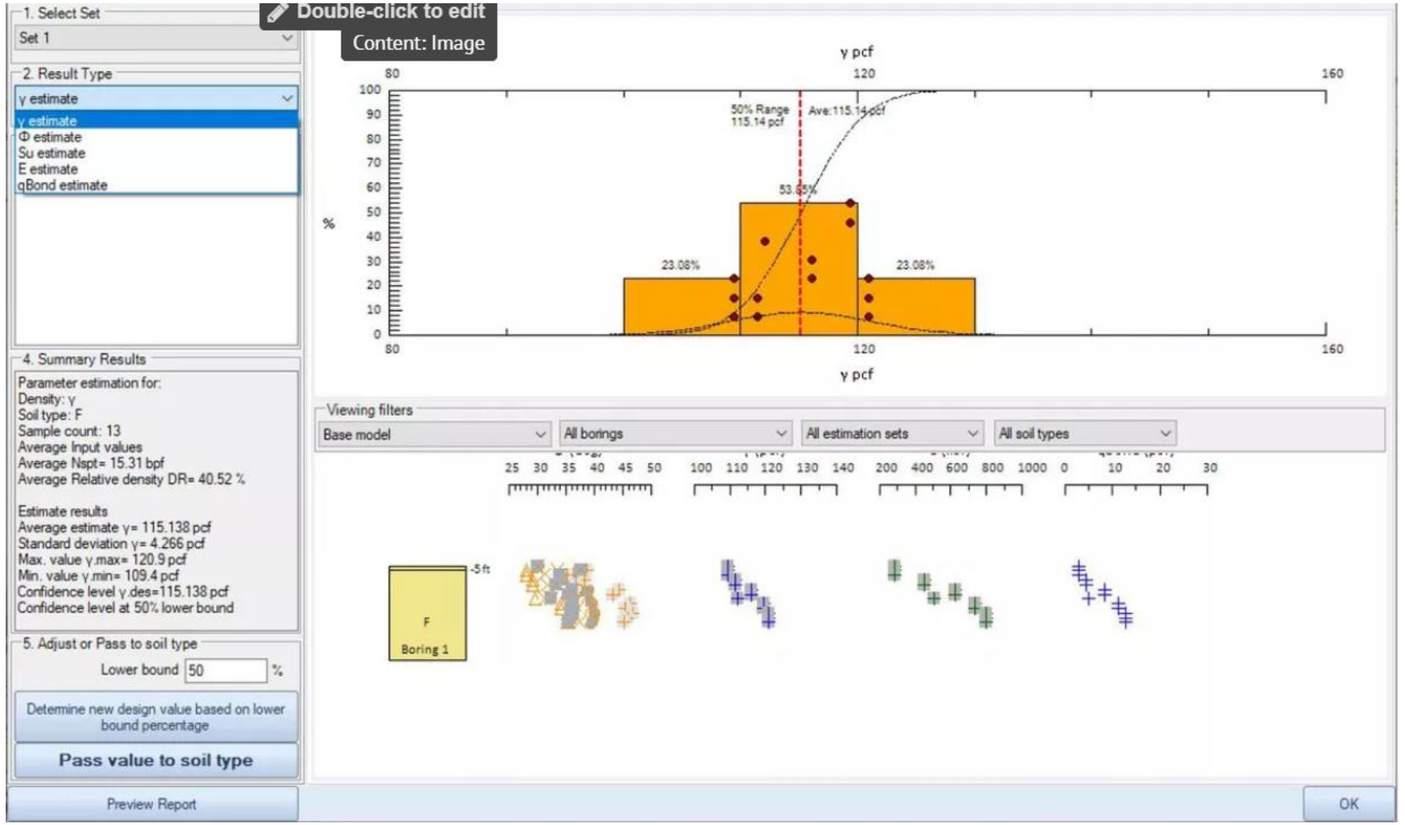
Soil Estimation - Statistical Analysis





- ✓ Estimate Soil Properties with different methods
- ✓ Review a statistical analysis of the estimated properties
- ✓ Select the project values with a high level of certainty



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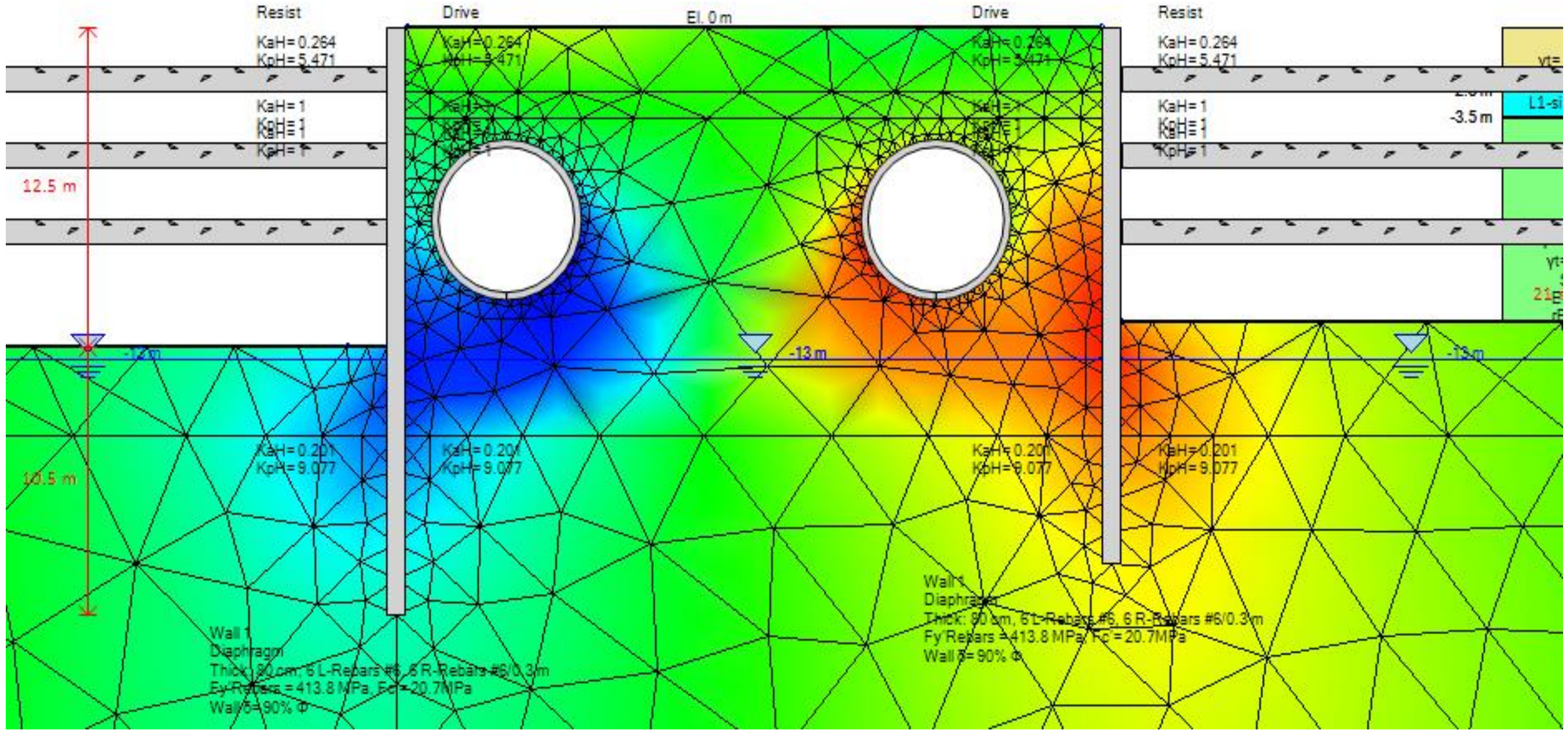
Finite Element Analysis and Tunnels



- ✓ DeepEX 2D FEM Engine (DeepFEM)
- ✓ Consider full soil-structure interaction
- ✓ Automatic FE options
- ✓ Soil Models for FEM
- ✓ Include Tiedowns & Foundation Piles

Tunnel Options:

- ✓ Tunnel Analysis with FEM
- ✓ TBM Tunnels
- ✓ NATM - SEM Tunnels
- ✓ Oval and Complex Tunnel Shapes
- ✓ Tunnel Model Wizard
- ✓ Cut-and-Cover Tunnels

The module is optional in DeepEX 2D Version, included in DeepEX 3D and 3D City packages

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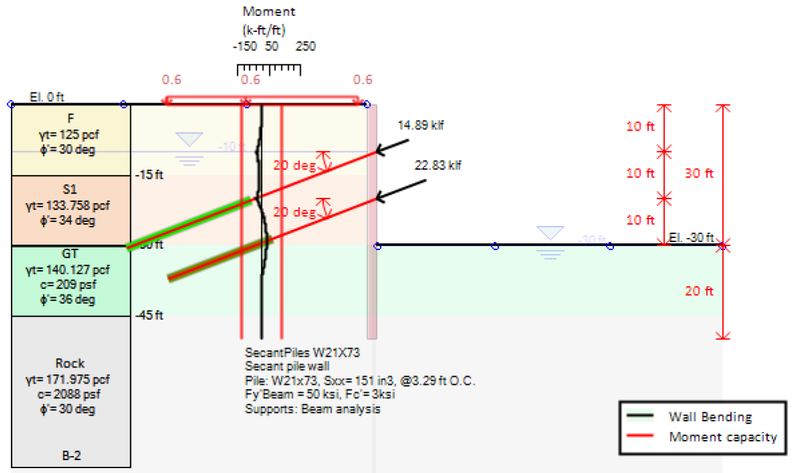
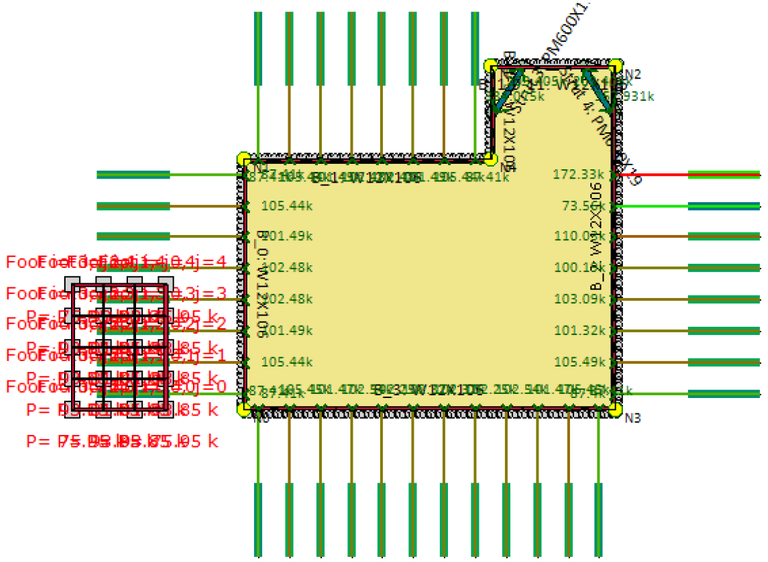
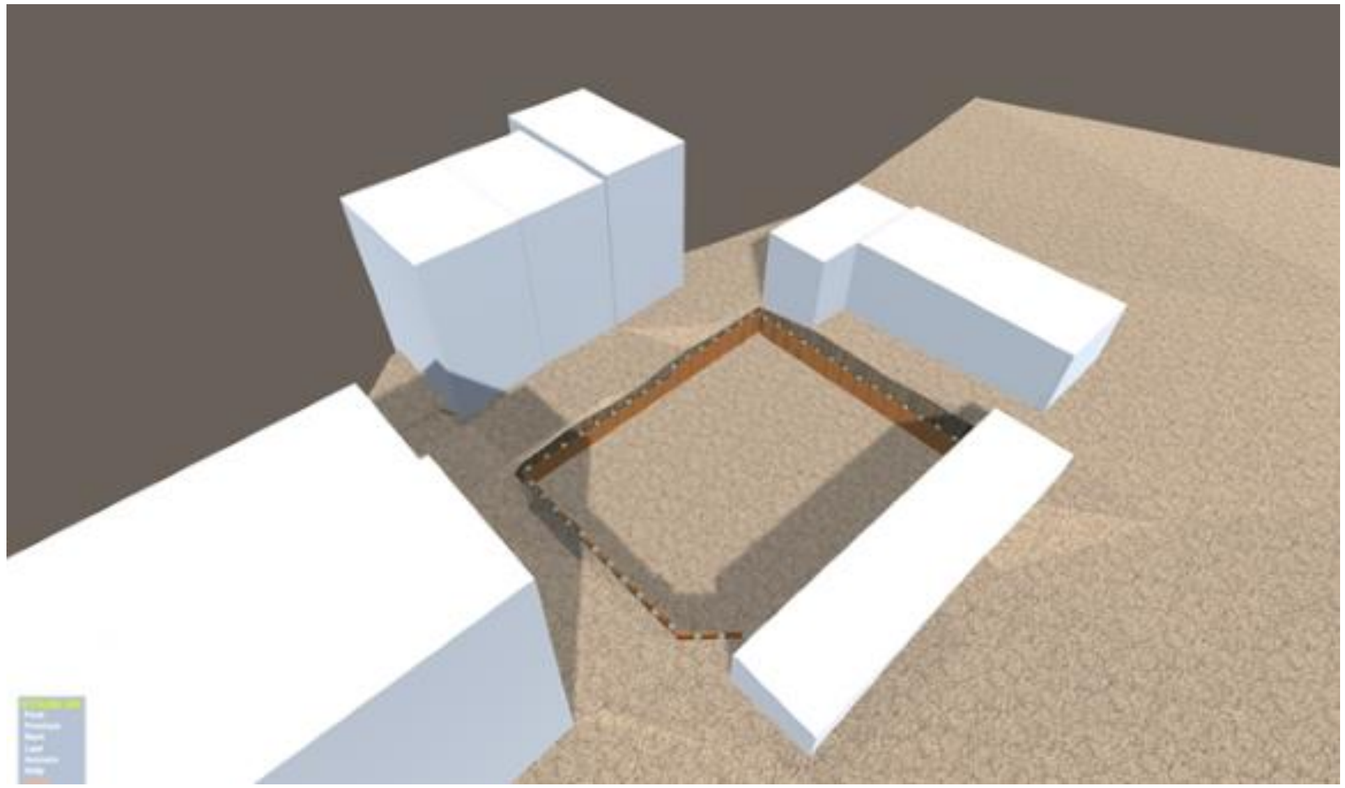
2D Sections & 3D Models, 3D Holograms





- ✓ Full Design - 2D Sections and 3D Model
- ✓ Structural & Geotechnical design of Tiebacks and Struts
- ✓ 3D Building Loads
- ✓ Full Model Optimization (Walls and Supports)
- ✓ Virtual Reality Model Visualization - Export Model to HoloDeepEX



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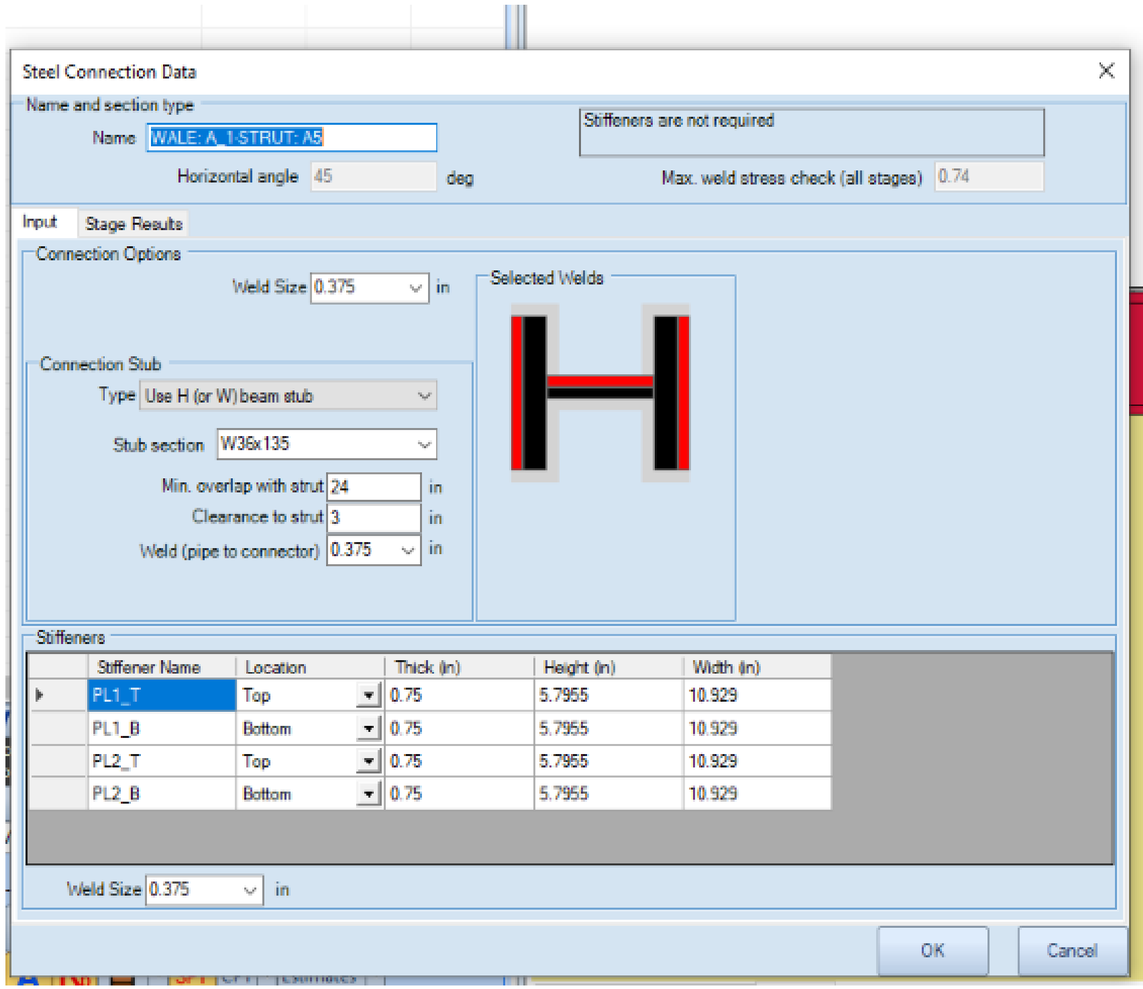
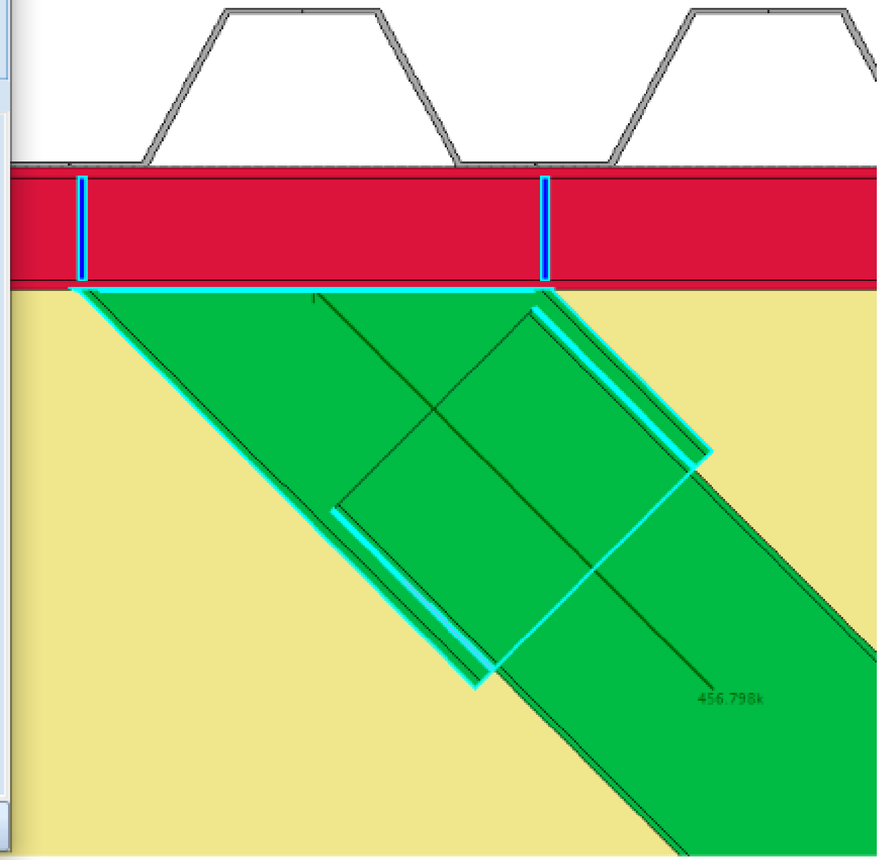
Check & Optimize Steel Connections





- ✓ Generate all steel connections
- ✓ Check Steel Connections (Struts and Walers)
- ✓ Optimize Steel Connections with a Click
- ✓ Adjust weld sizes and apply plate stiffeners

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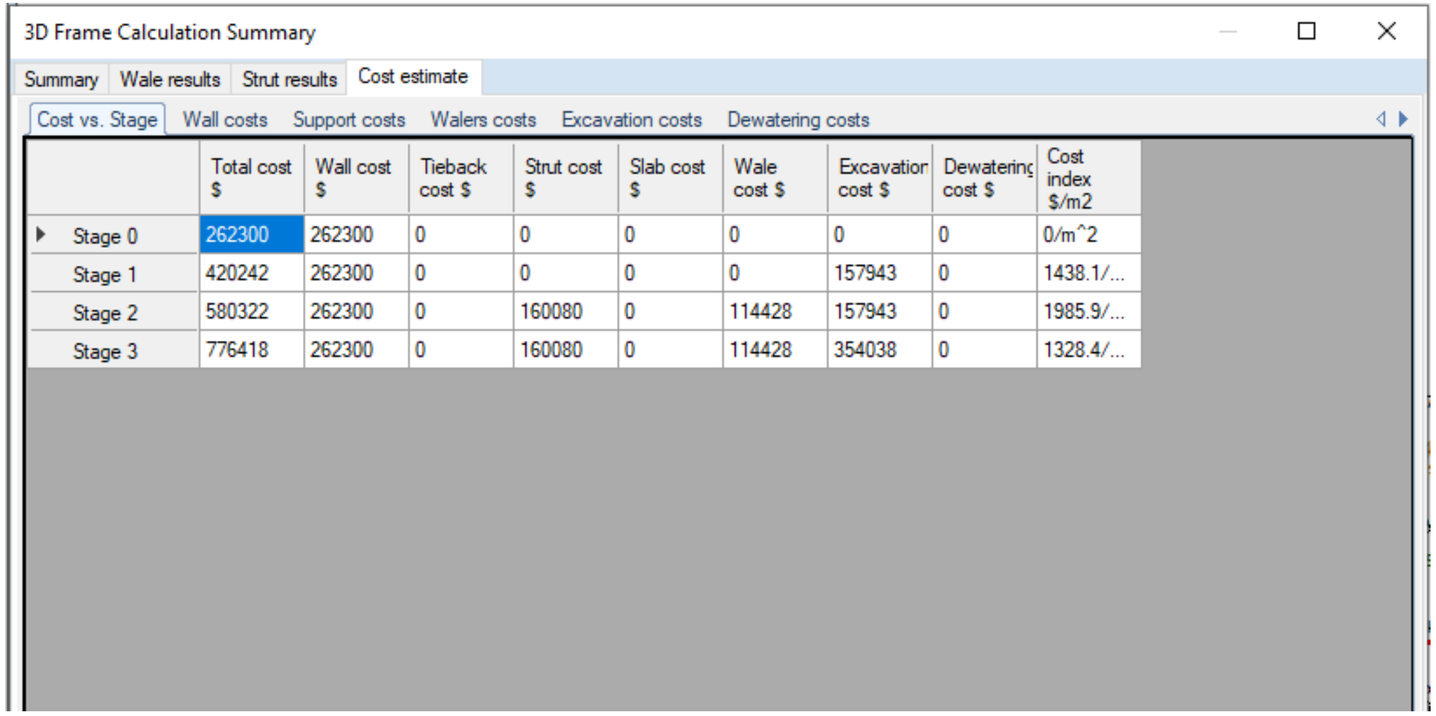
Project Cost Estimation

- ✓ Edit and save your cost database
- ✓ Calculate project material quantities
- ✓ Estimate project costs in detail (labor and materials)
- ✓ Review summary and detained cost estimation reports



	Total cost $	Wall cost $	Tieback cost $	Strut cost $	Slab cost $	Wale cost $	Excavation cost $	Dewatering cost $	Cost index $/m2
Stage 0	262300	262300	0	0	0	0	0	0	0/m^2
Stage 1	420242	262300	0	0	0	0	157943	0	1438.1/...
Stage 2	580322	262300	0	160080	0	114428	157943	0	1985.9/...
Stage 3	776418	262300	0	160080	0	114428	354038	0	1328.4/...

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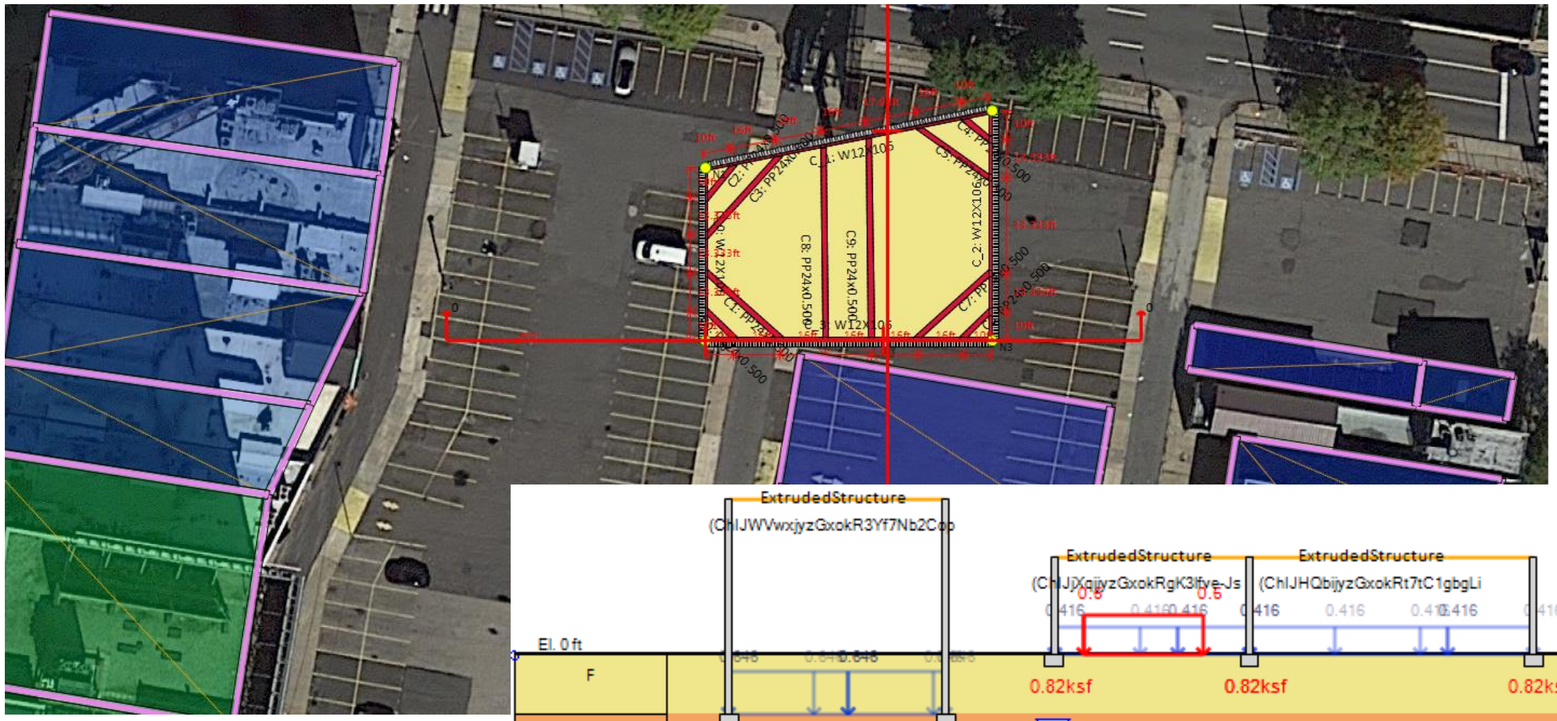
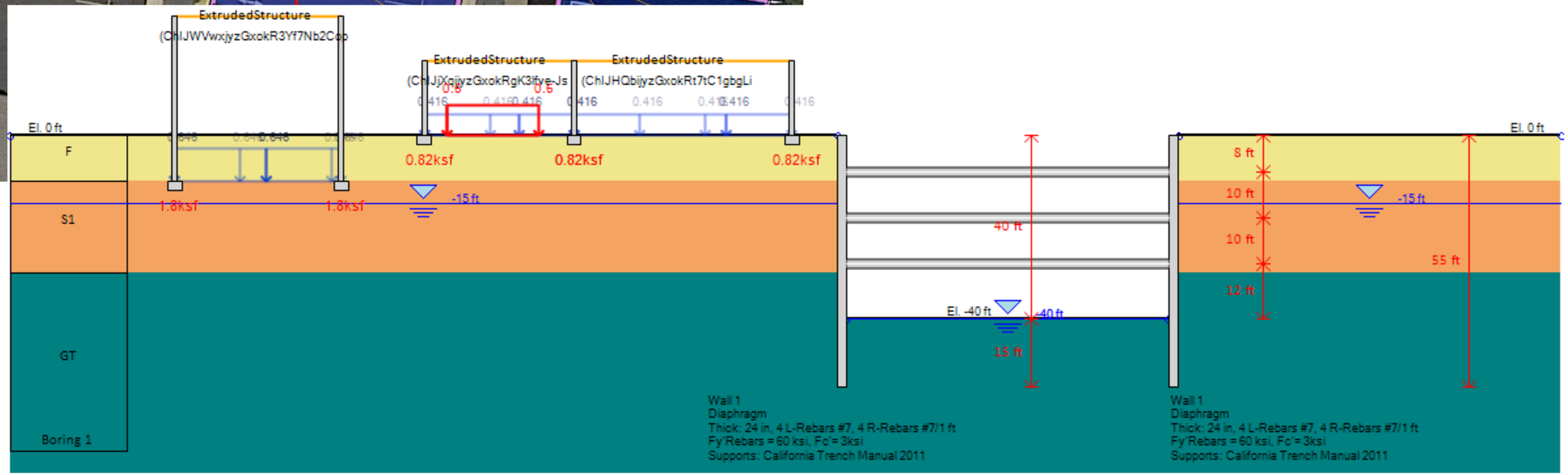
Import Site Map & Buildings from Google





- ✓ Import your Excavation Site from Google Maps
- ✓ Import all buildings directly from Google
- ✓ Estimate the building dimensions and loads
- ✓ Generate 2D cut sections
- ✓ Perform Damage Assessment for all buildings

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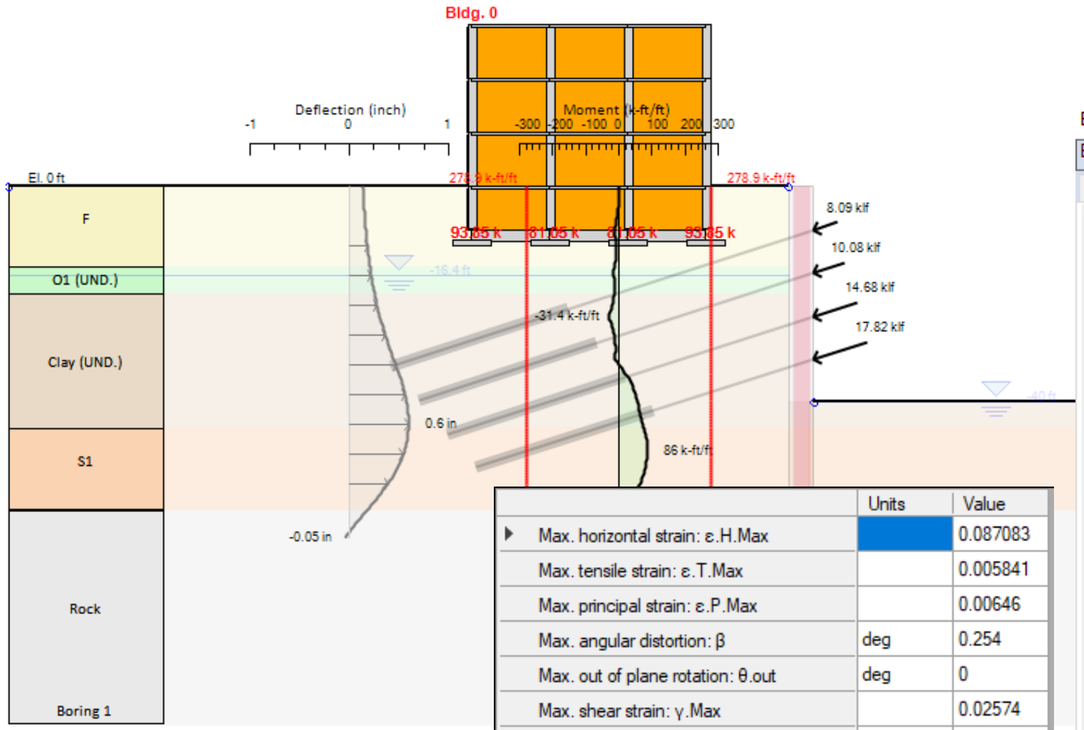
Building Damage Assessment

- ✓ Perform Damage Assessment of all Buildings close to an excavation site
- ✓ Review Crack widths, Damage Categories, Strains etc. for all building walls.



	Units	Value
Max. horizontal strain: ε.H.Max		0.087083
Max. tensile strain: ε.T.Max		0.005841
Max. principal strain: ε.P.Max		0.00646
Max. angular distortion: β	deg	0.254
Max. out of plane rotation: θ.out	deg	0
Max. shear strain: γ.Max		0.02574
Ave. shear strain: γ.Ave		0.003359
Cumulative principal crack width C.p	in	0.2936
Cumulative tensile crack width C.t	in	0.3409
Max principal crack width Cr.p.Max	in	0.1957
Max tensile crack width Cr.t.Max	in	0.2273
Max. damage category		Moderate
Damage category crack width		Moderate
Damage category Boscardin Cording		Moderate

Building Damage Results

Bldg. 0

Maximum values | All elements | Individual elements | Horizontal movement | Settlement | Boscardin-Cording Chart | Hogging Chart (Burland 1979)

		θ.out	γ.Max	γ.Ave	C.p (in)	C.t (in)	Cr.p (in)	Cr.t (in)	Damage Cat	Dam. Crack width	Dam. Boscardin
Bottom side continuous basement wall	203	0	0.005103	0.002551	0	0	0	0	Moderate	Negligibe	Moderate
Left side continuous basement wall	277	0	0.000752	0.000376	0	0	0	0	Negligibe	Negligibe	Negligibe
Right side continuous basement wall	926	0	0.002511	0.001256	0	0	0	0	Negligibe	Negligibe	Negligibe
Top side continuous basement wall		0	0	0	0	0	0	0	Negligibe	Negligibe	Negligibe
Exterior wall at floor 1El. 0, (-10.67, 30 to -20.67,30)	407	0	0.025554	0.001561	0.2327	0.3337	0.1551	0.2225	Moderate	Moderate	N/A
Exterior wall at floor 1El. 0, (-20.67, 70 to -10.67,70)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-20.67, 30 to -30.67,30)	872	0	0.022453	0.002095	0.0798	0.0299	0.0532	0.0199	Slight	Slight	N/A
Exterior wall at floor 1El. 0, (-30.67, 70 to -20.67,70)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-30.67, 30 to -40.67,30)	558	0	0.014831	0.001949	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-40.67, 70 to -30.67,70)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-10.67, 40 to -10.67,30)	439	0	0.02574	0	0.153	0.2154	0.102	0.1436	Slight	Slight	N/A
Exterior wall at floor 1El. 0, (-40.67, 30 to -40.67,40)	34	0	0.007772	0.001901	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-10.67, 50 to -10.67,40)	169	0	0.02417	0	0.2936	0.1803	0.1957	0.1202	Slight	Slight	N/A
Exterior wall at floor 1El. 0, (-40.67, 40 to -40.67,50)	391	0	0.002266	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-10.67, 60 to -10.67,50)	336	0	0.013545	0	0.0476	0	0.0317	0	Very slight	Very slight	N/A
Exterior wall at floor 1El. 0, (-40.67, 50 to -40.67,60)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-10.67, 70 to -10.67,60)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 1El. 0, (-40.67, 60 to -40.67,70)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 2El. 10, (-10.67, 30 to -20.67,30)	407	0	0.025554	0.001561	0.1975	0.2805	0.1317	0.187	Slight	Slight	N/A
Exterior wall at floor 2El. 10, (-20.67, 70 to -10.67,70)		0	0	0	0	0	0	0	Negligibe	Negligibe	N/A
Exterior wall at floor 2El. 10, (-20.67, 30 to -30.67,30)	872	0	0.022453	0.002095	0.1566	0.2011	0.1044	0.1341	Slight	Slight	N/A

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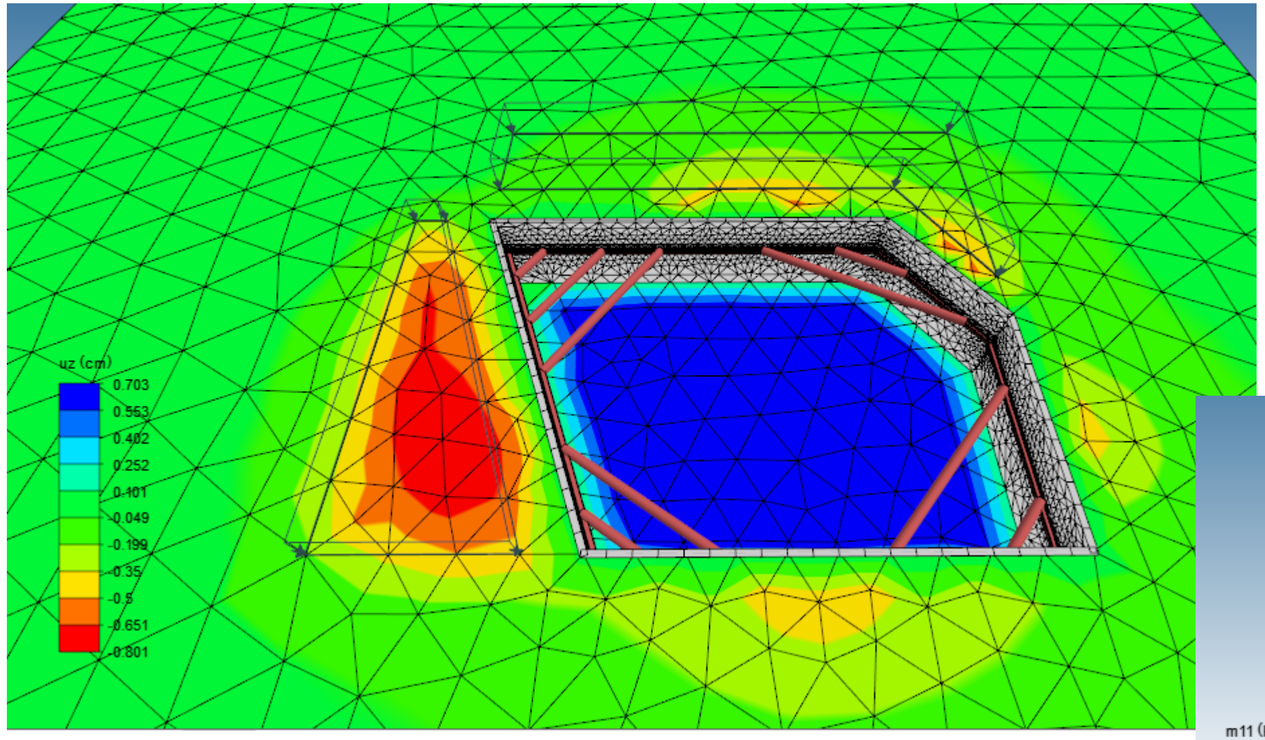
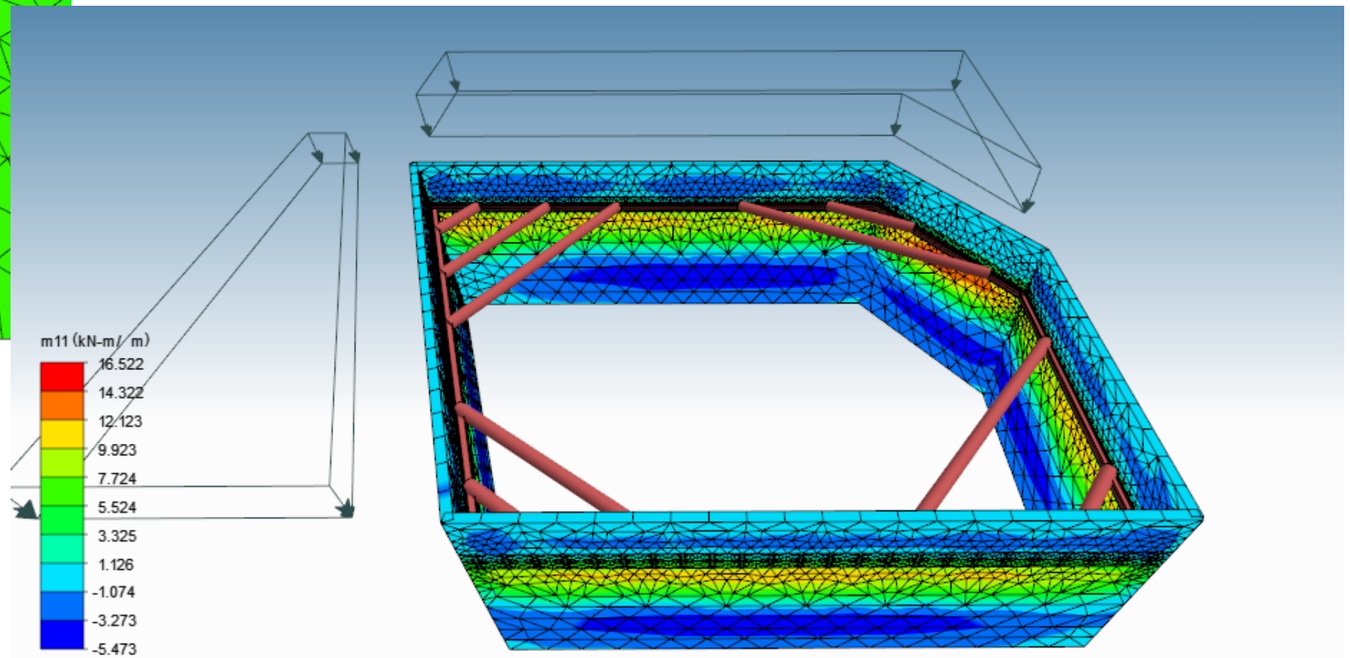
3D Finite Element Analysis



- ✓ Generate any 3D FEM model in seconds with our powerful wizards
- ✓ Parametrical model creation and edit - access and edit all the items in the model area in seconds
- ✓ Perform 3D FEM considering full soil-structure interaction
- ✓ Review results in tables for all walls, walers and supports
- ✓ Perform structural checks on all supports and walers
- ✓ Review 3D FEM shadings for soil, walls and supports for all stages



The module is optional in DeepEX 3D package, it is included in the DeepEX 3D City package

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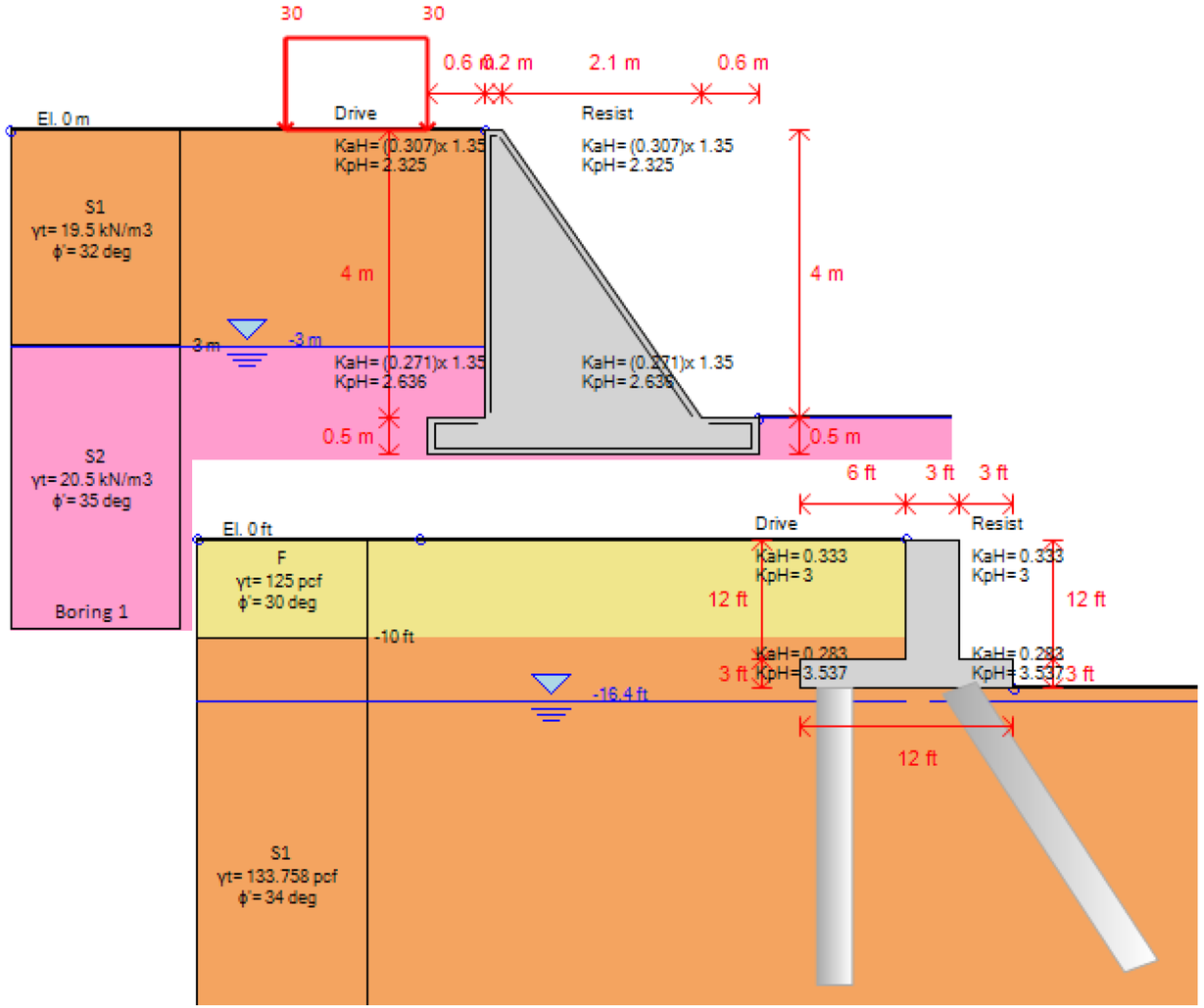
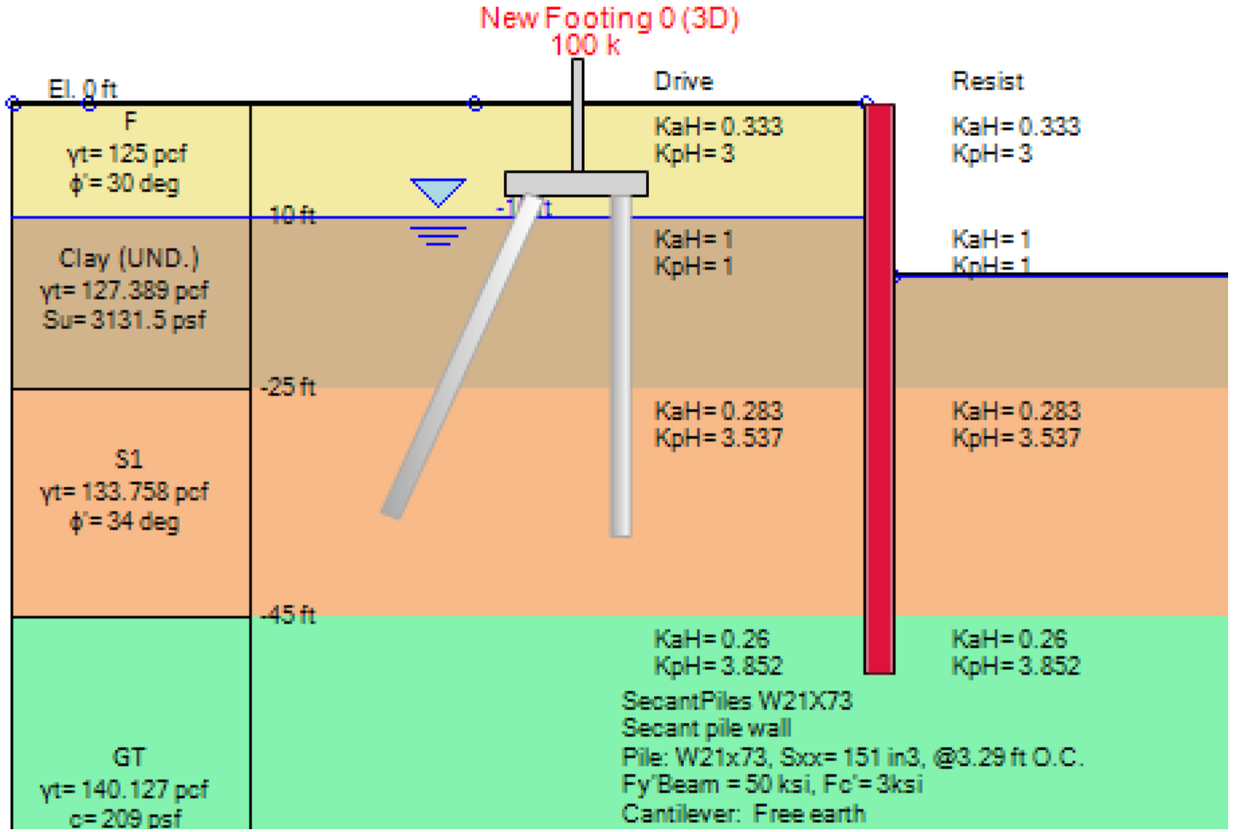
Gravity Walls & Pile Abutments



- ✓ Design gravity walls (any shape)
- ✓ Design pile supported abutments
- ✓ Use footings (3D loads) and design the foundation piles



The module Gravity Walls/Pile Abutments/Sea Walls/MSE is optional in DeepEX 2D and 3D packages, it is included in the DeepEX 3D City package.

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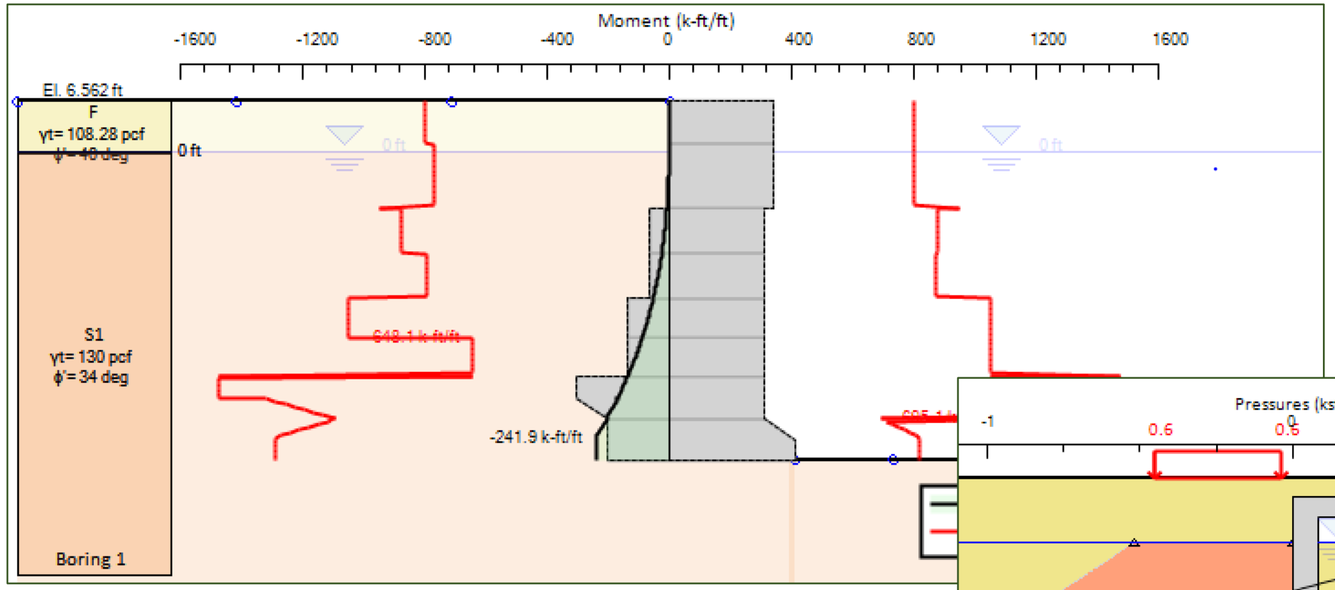
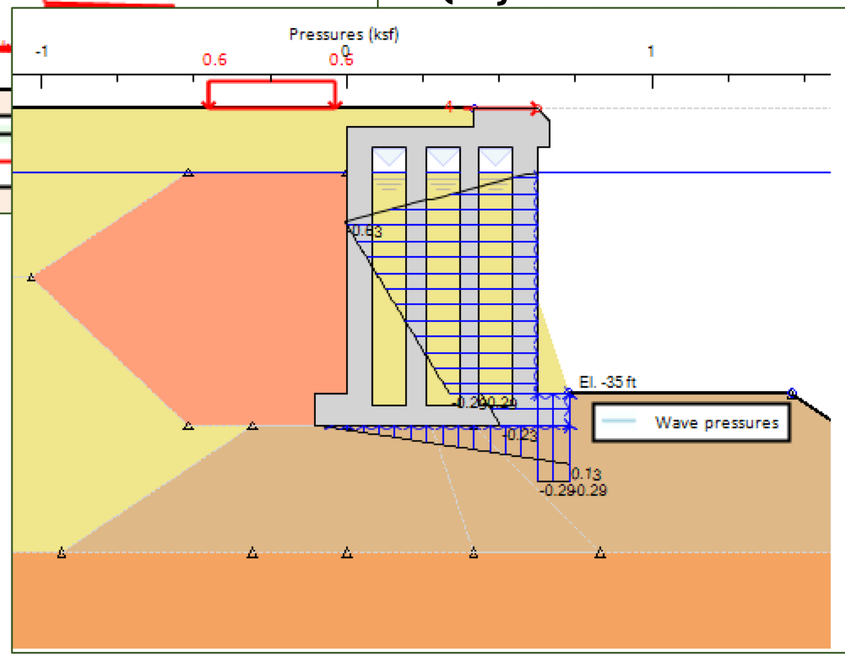
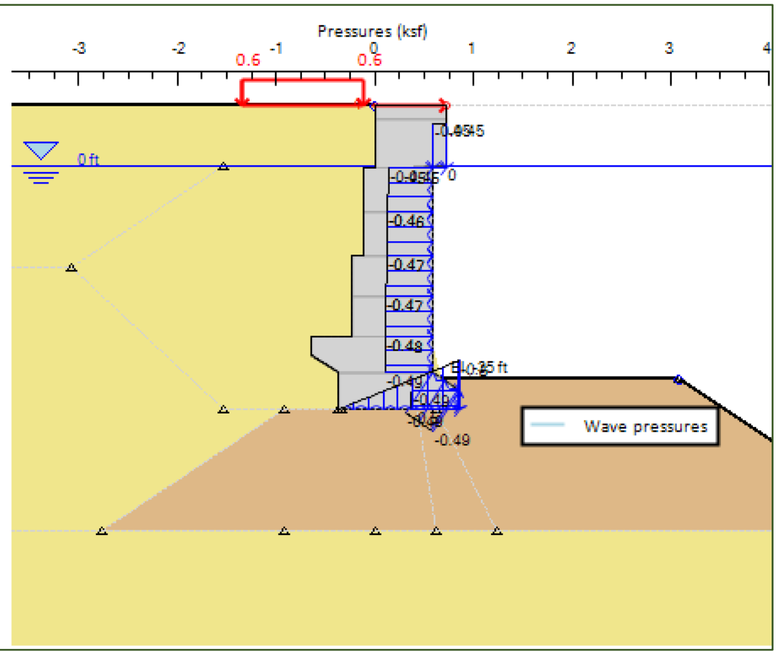
Sea Walls - Quay Walls - Wave Pressures



- ✓ Load combinations for British Standards 6349 Parts 1-2 (Marine Structures-Quay Walls)
- ✓ Wave pressures with Sainflou, McConnel, Proverbs
- ✓ Average overtopping volume calculations
- ✓ Block/segmental walls with individual shear resistances and densities
- ✓ Quay caisson walls (3D) with infill zones. The program can calculate the 3D weight
- ✓ Quay wall wizard - Create a model in minutes





The module Gravity Walls/Pile Abutments/Sea Walls/MSE is optional in DeepEX 2D and 3D packages, it is included in the DeepEX 3D City package.

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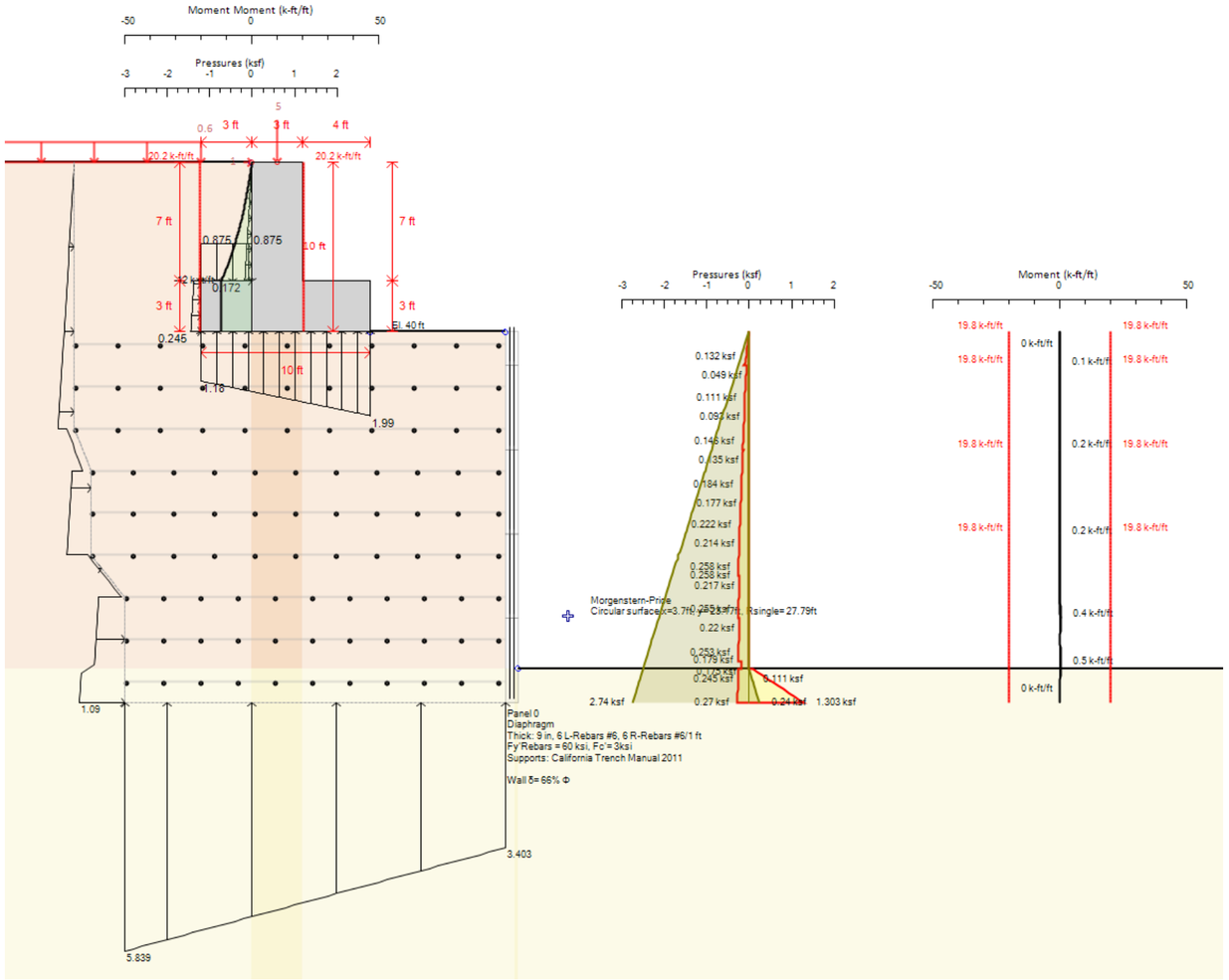
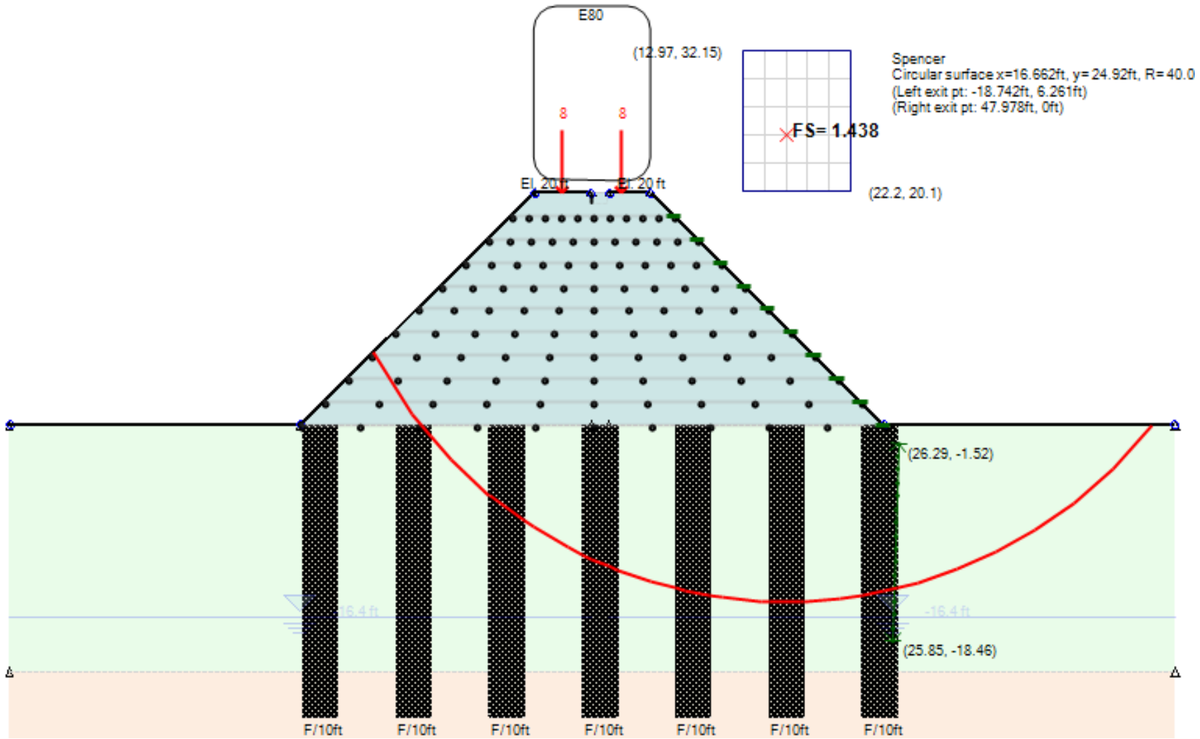
MSE Walls - Soil Reinforcements - Embankments



- ✓ Steel grids and strips, geogrids, geotextiles for slope stabilizations
- ✓ Stone columns and adaptive soil improvement. Stone column shear strength calculation from replacement ratios.
- ✓ Embankment Wizard with loading, geo-reinforcements, train loading, stone columns, etc.



The module Gravity Walls/Pile Abutments/Sea Walls/MSE is optional in DeepEX 2D and 3D packages, it is included in the DeepEX 3D City package.

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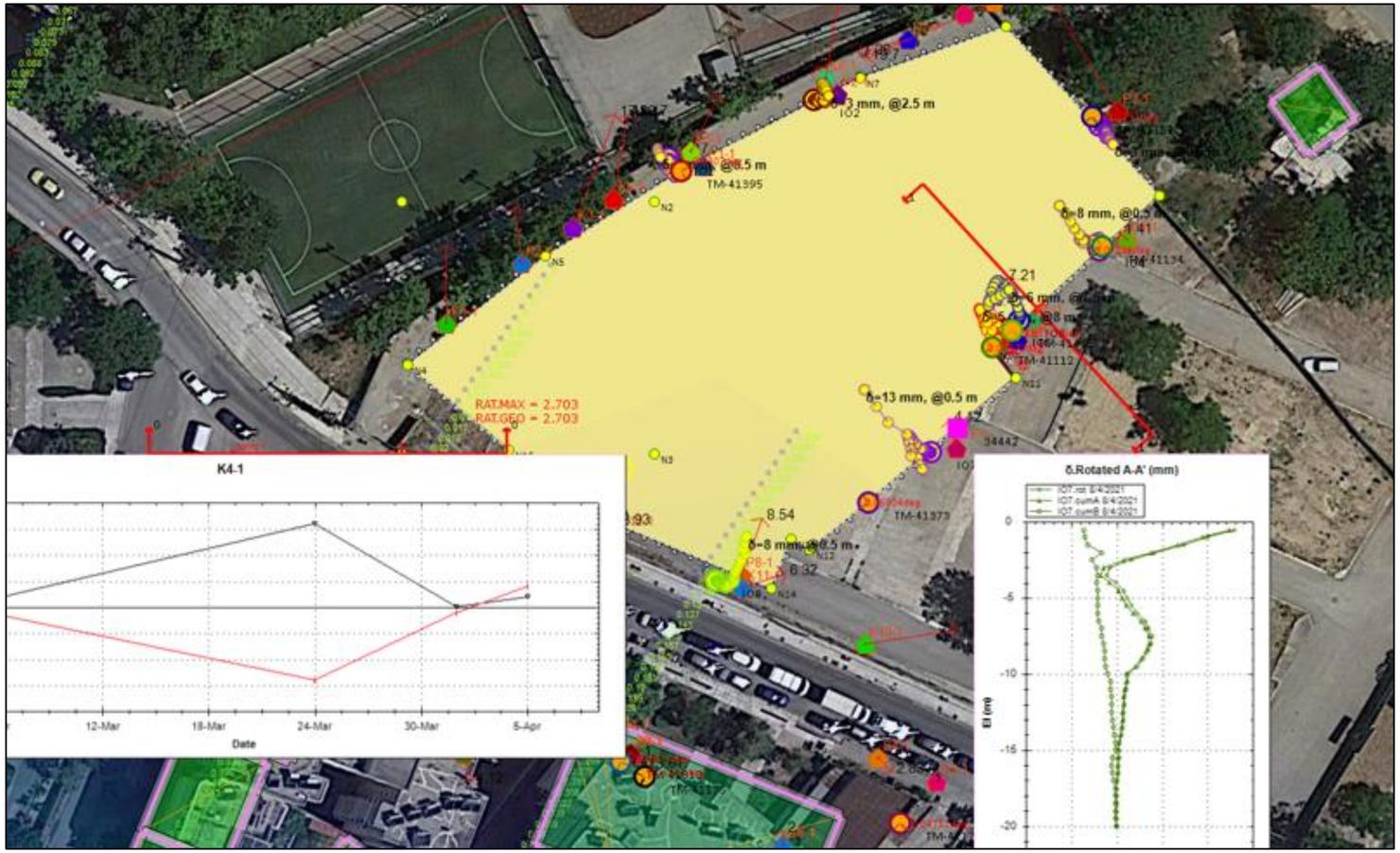
Integration with Monitoring Data



- ✓ Import Inclinometer readings from SiteMaster
- ✓ Associate Inclinometers with Construction Stages
- ✓ Calculate Bending Moments from Inclinometers
- ✓ Perform Live Checks on all supports and walers
- ✓ Check Models under Predefined Displacements
- ✓ Display Graphs in 2D Sections and 3D Plan View

The module is optional in DeepEX 3D package, it is included in the DeepEX 3D City package

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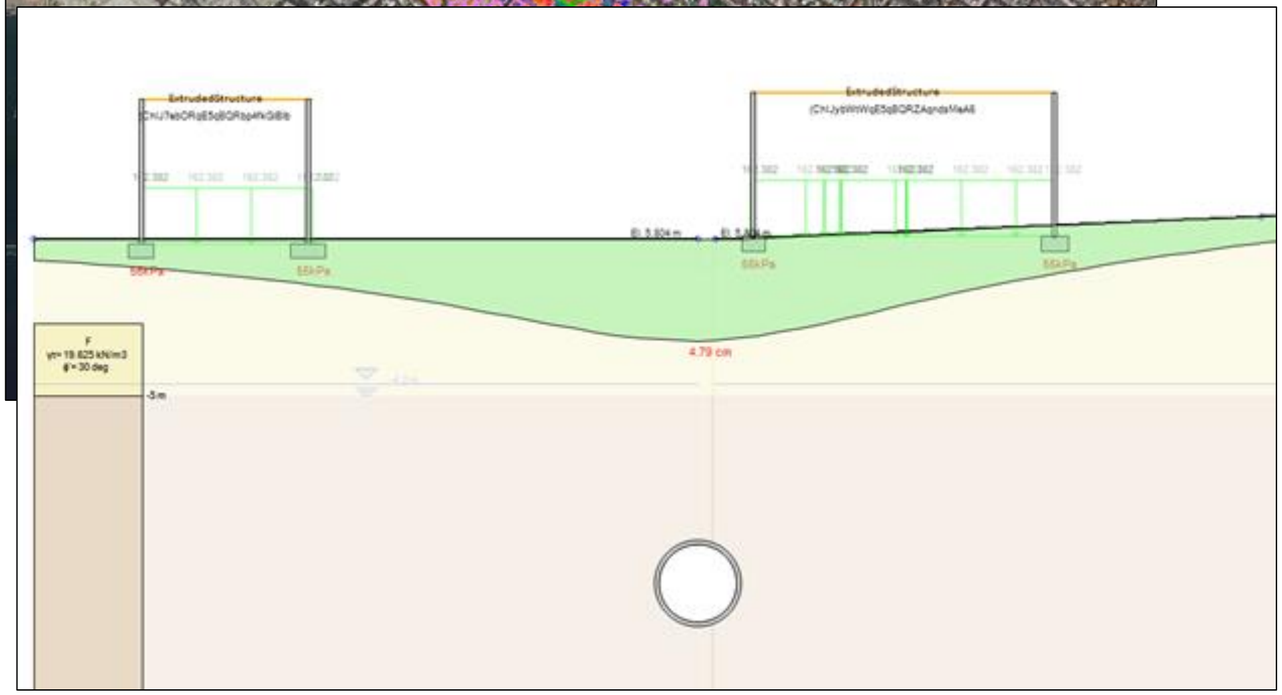
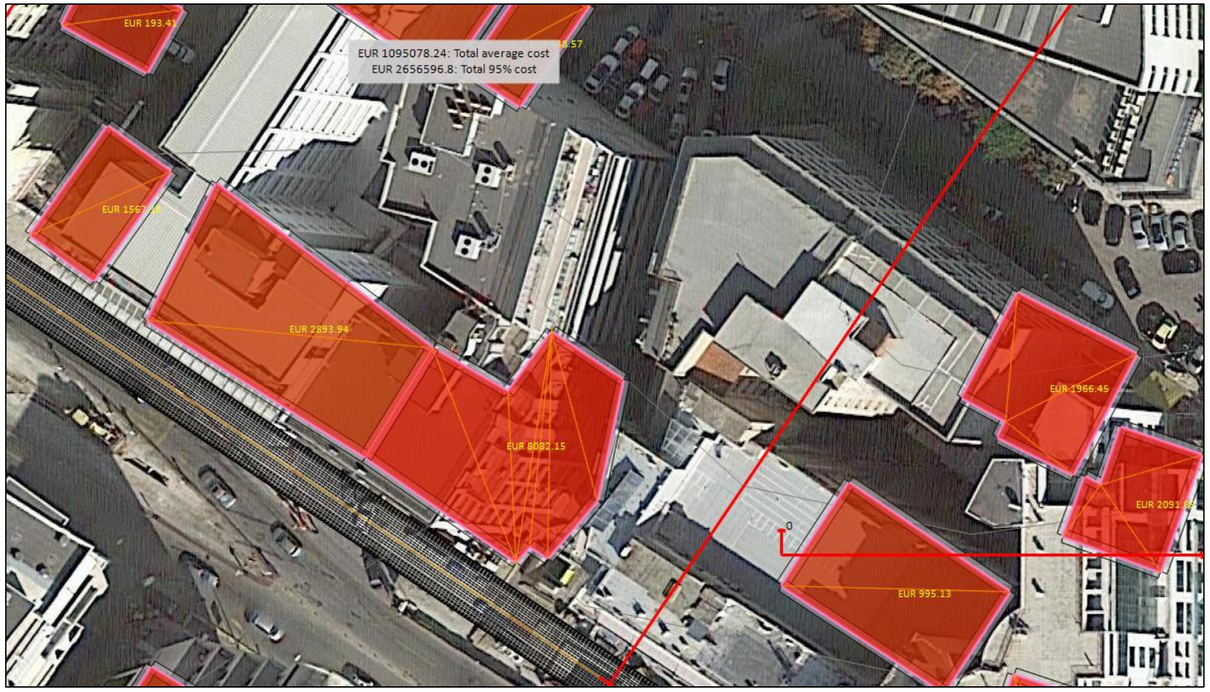
Citywide Tunnels Damage Assessment

The Future is Here!

- ✓ Import your City Map with all Structures from Google
- ✓ Define your Tunnel Construction Stages and Location on the Map
- ✓ Automatically Generate 2D Cut Sections along your Tunnel
- ✓ Define your Metro Station Locations on the Map and Design Them
- ✓ Analyze the Tunnel, Calculate Settlements considering Soil Volume Loss, Consolidation and Water Drawdown
- ✓ Estimate the Damage Cost for all Imported Buildings

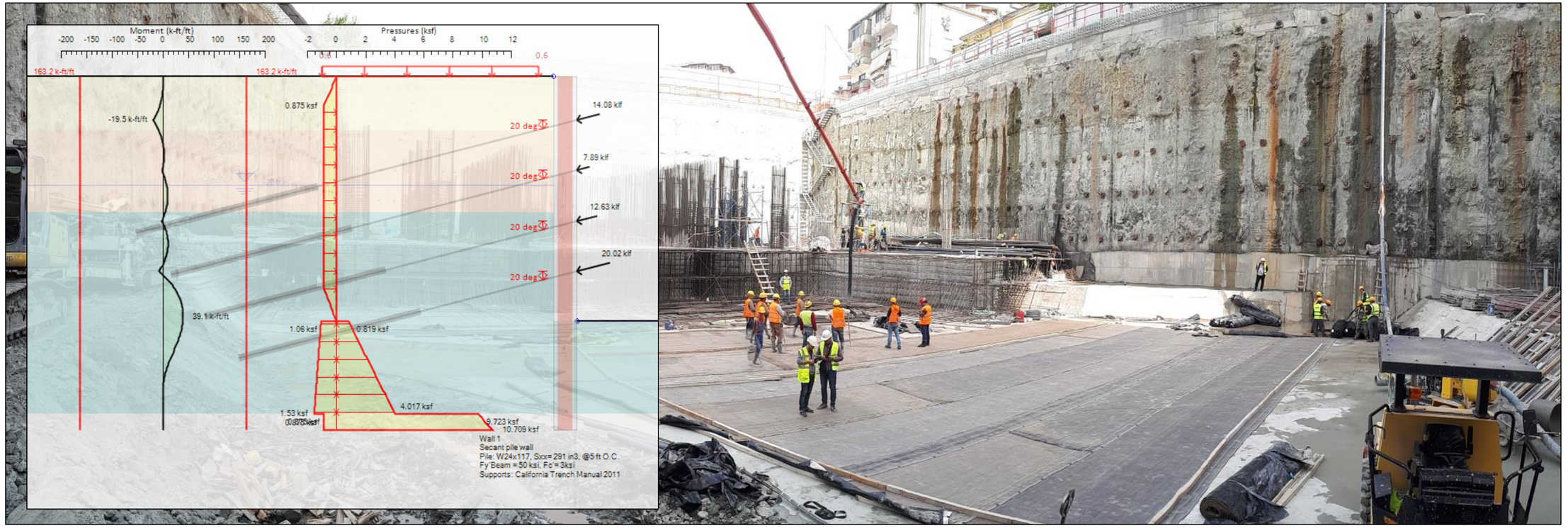
And more!





www.deepexcavation.com

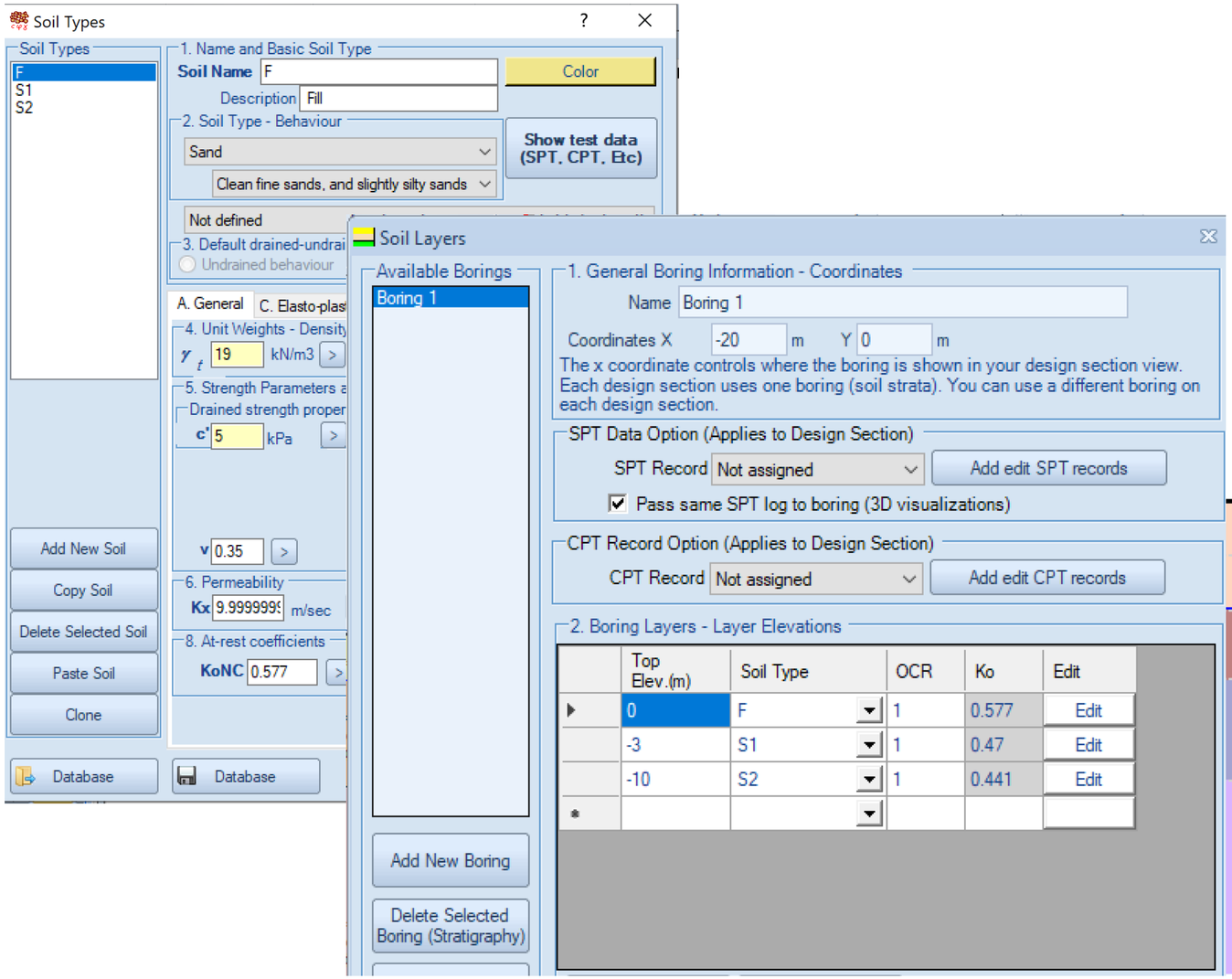
DeepEX: Use & Methods



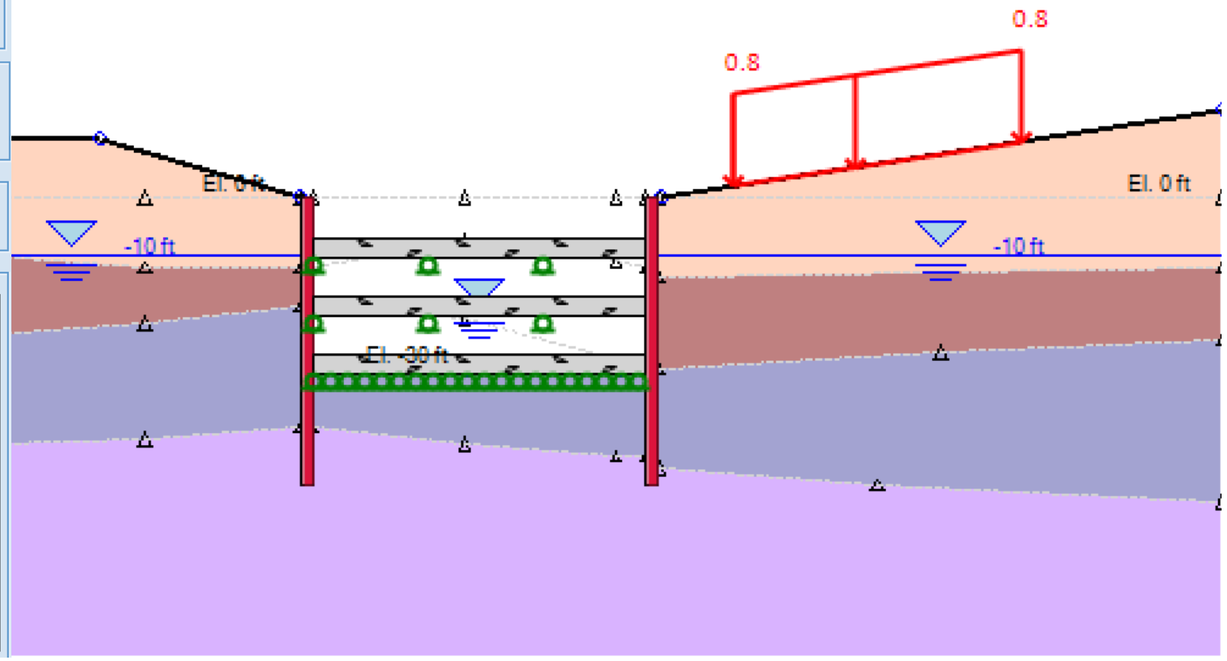
Access deepexcavation.com
Use of DeepEX - Wall Types & Support Systems

DeepEX
Shoring Design Software

Soil Types & Stratigraphy



- ✓ 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 Change Commands: Change soil properties through stages



DeepEX
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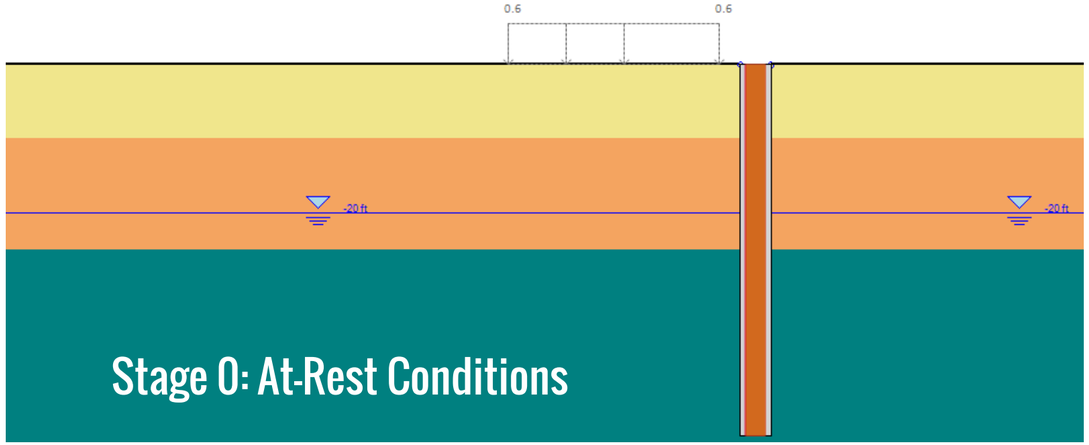
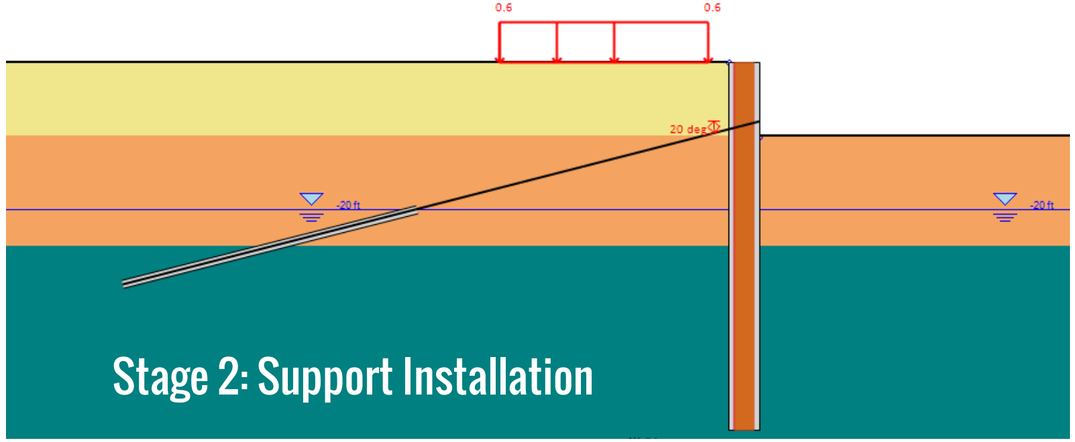
Include All Construction Stages

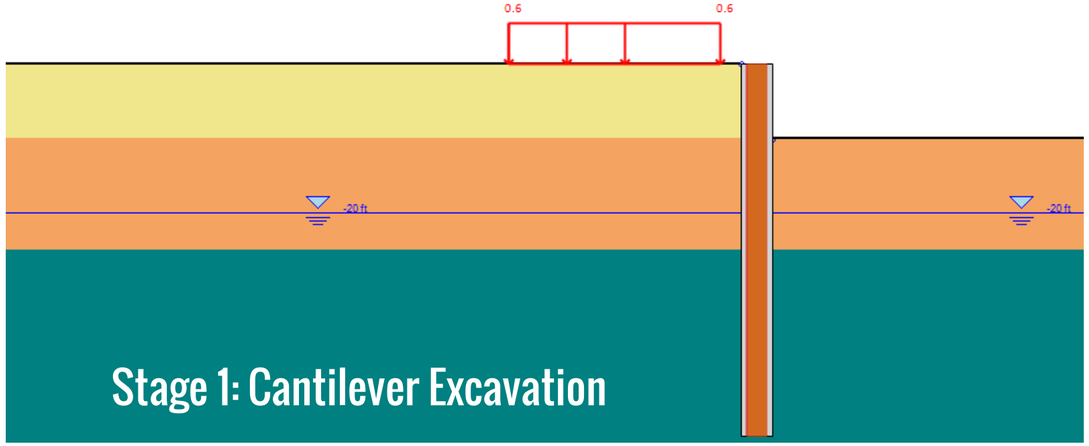
- ✓ Create all intermediate construction stages
- ✓ Review the results for each stage & recognize the critical stages
- ✓ Perform an efficient model optimization
- ✓ Get more realistic results for methods that consider staging (NL, FEM)



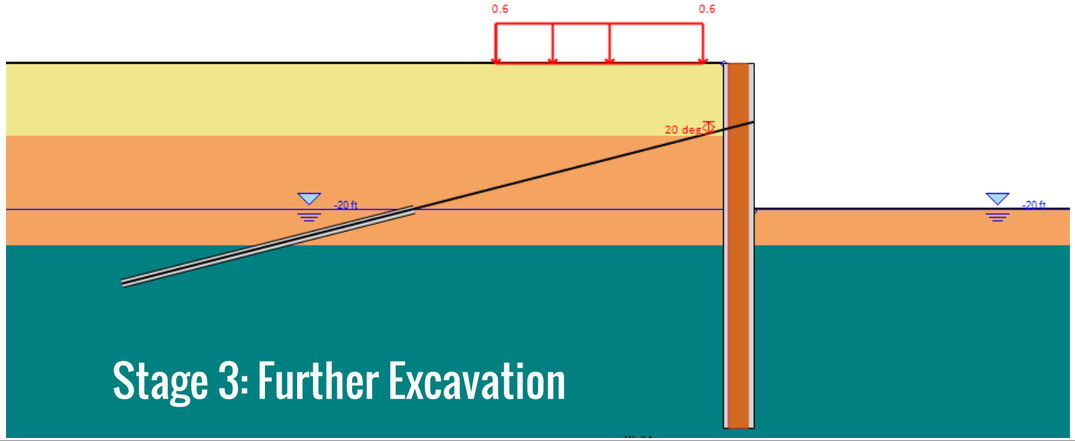
Stage 0: At-Rest Conditions



Stage 2: Support Installation



Stage 1: Cantilever Excavation

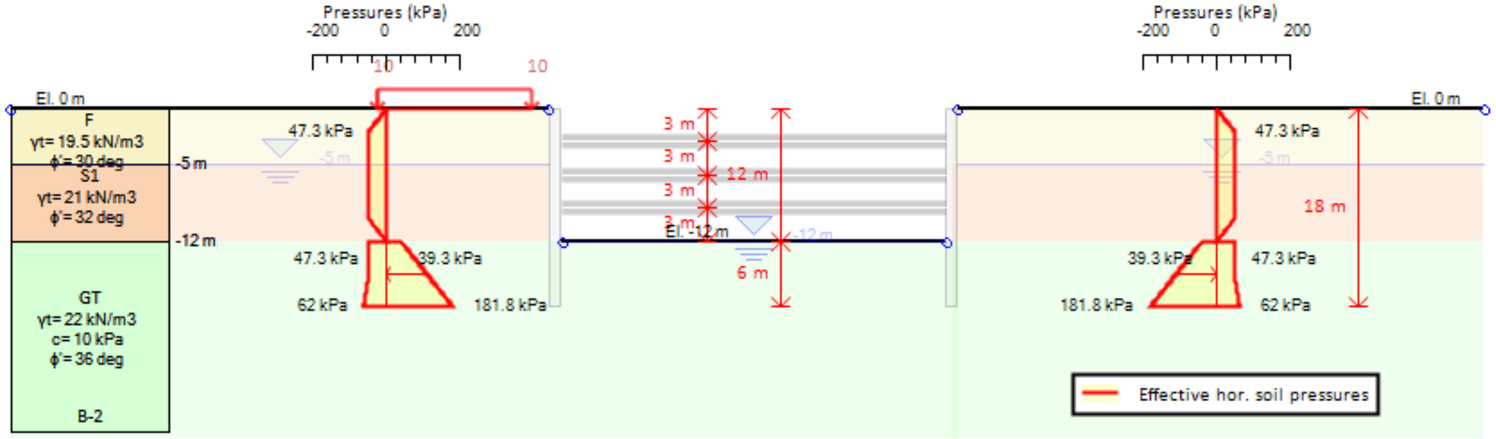


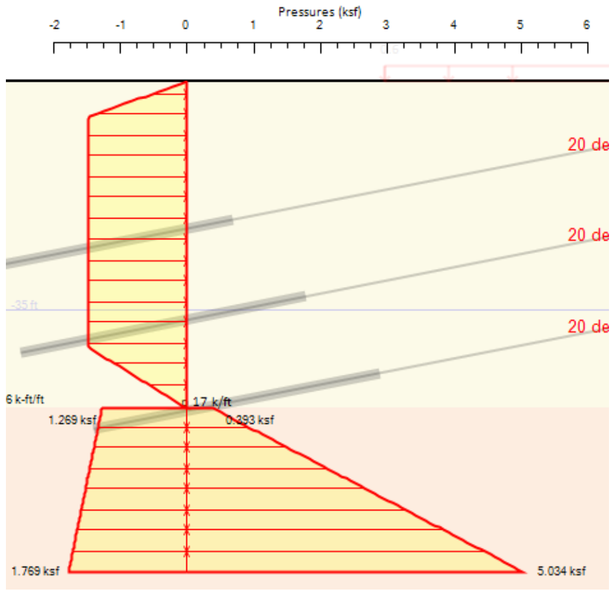
Stage 3: Further Excavation

DeepEX
Shoring Design Software

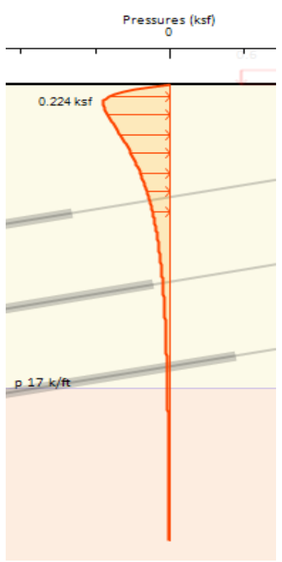
Limit Equilibrium Analysis Concept (LEM)

- ✓ Assume lateral earth pressures.
- ✓ Determine fixity locations for forces at subgrade.
- ✓ Analyze wall beam with assumed loads.
- ✓ Advantages: Easy method to verify. Gives a back check for more rigorous methods.
- ✓ Disadvantages: Soil-structure interaction ignored.

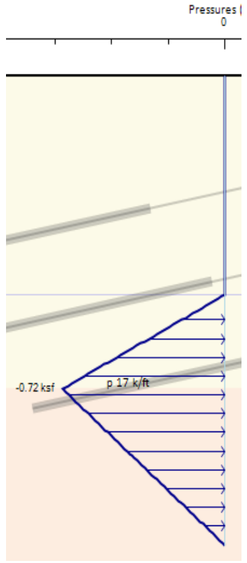




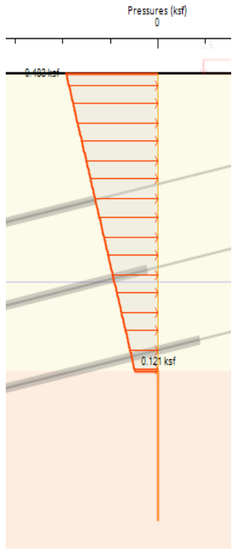
Soil Pressures



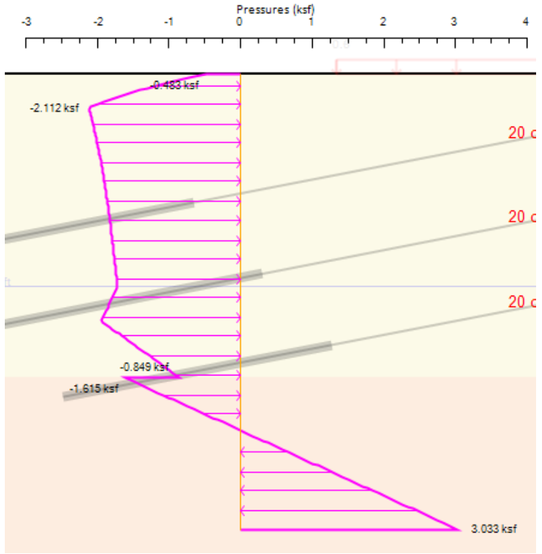
Surcharge



Water Pressures



Seismic Pressures



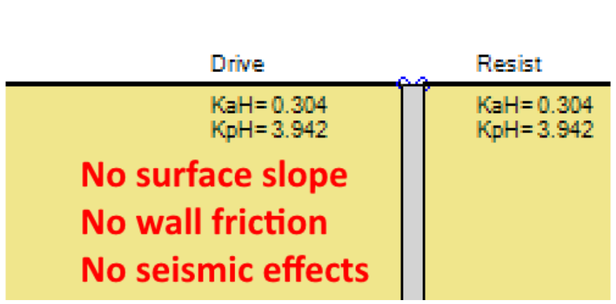
Net Pressures

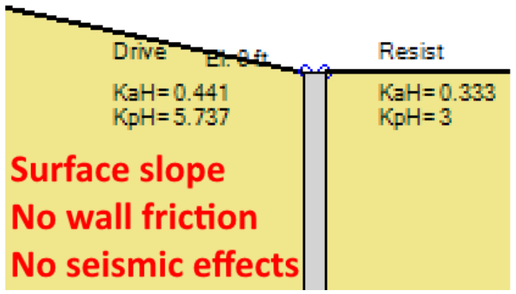
Earth Coefficients in DeepEX

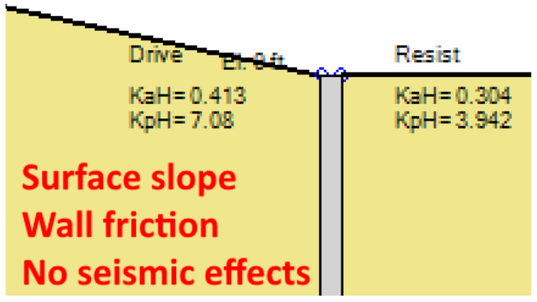
DeepEX Automatic Method Selection According to Project Parameters

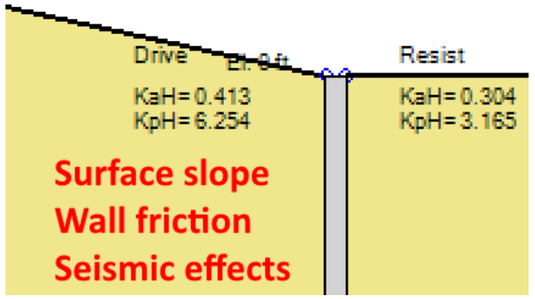
Active Coefficient Ka				
Parameters	Horizontal Surface	Inclined Surface	Wall Friction Considered	Seismic Effects Applied
Method	**Rankine**	**Coulomb**	**Coulomb**	**No Effect**

Passive Coefficient Kp				
Parameters	Horizontal Surface	Inclined Surface	Wall Friction Considered	Seismic Effects Applied
Method	**Rankine**	**Coulomb**	**Caquot-Kerisel**	**Lancelotta**









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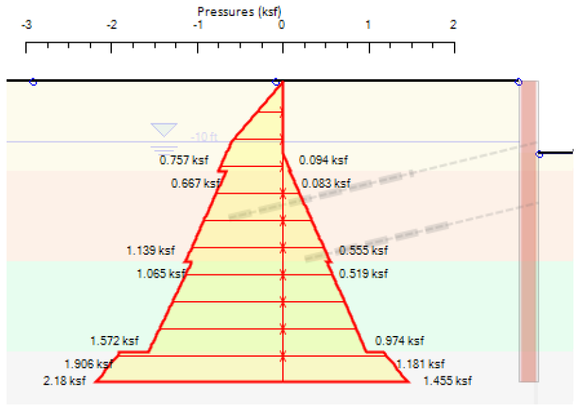
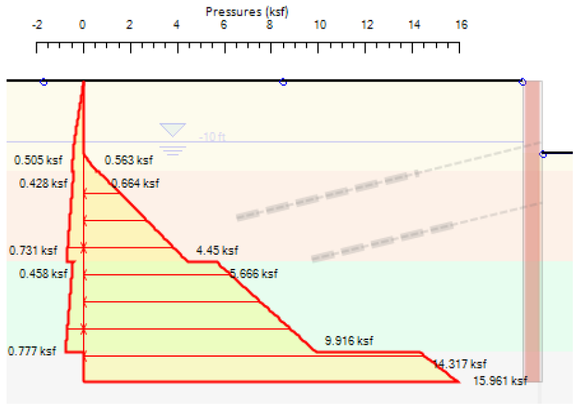
Soil Pressure Methods (LEM Analysis)

Cantilever Excavations

At-Rest Pressures

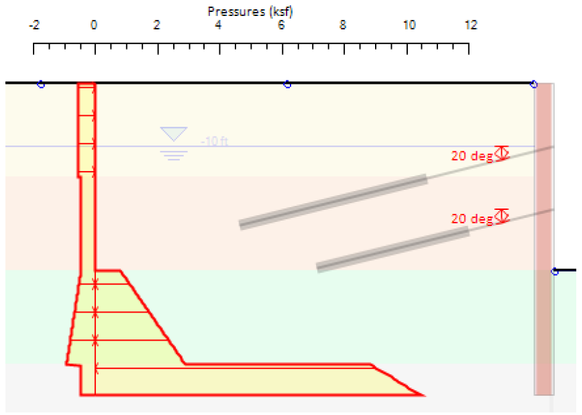


Active - Passive Pressures

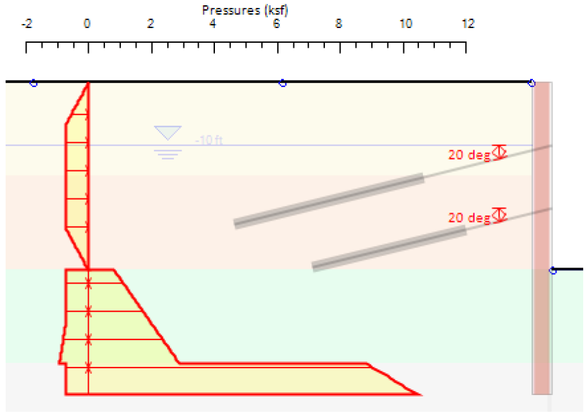


Construction Stages with multiple support levels

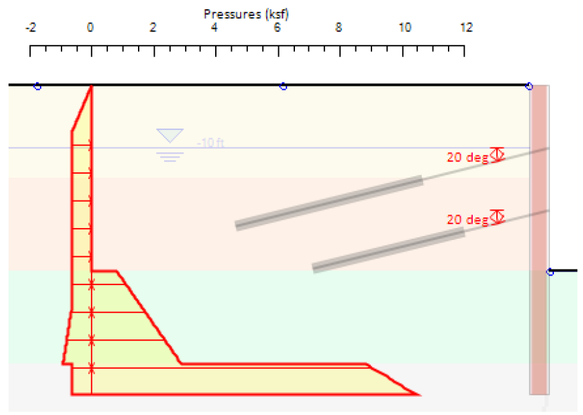
Peck 1969 Pressures



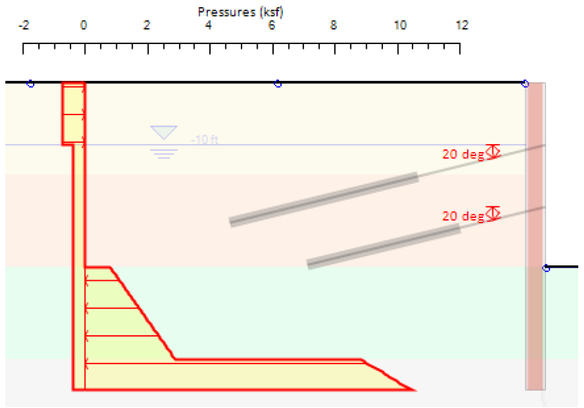
FHWA Apparent Pressures



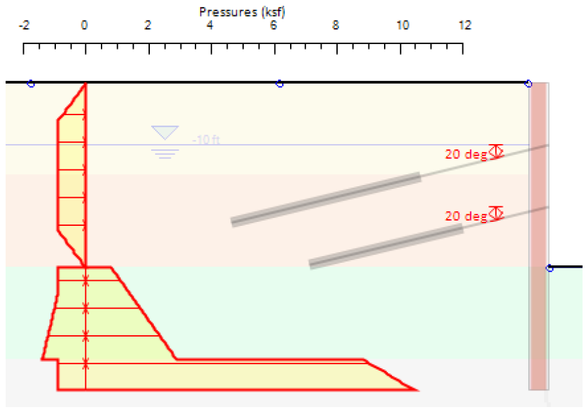
Custom Trapezoidal Pressures



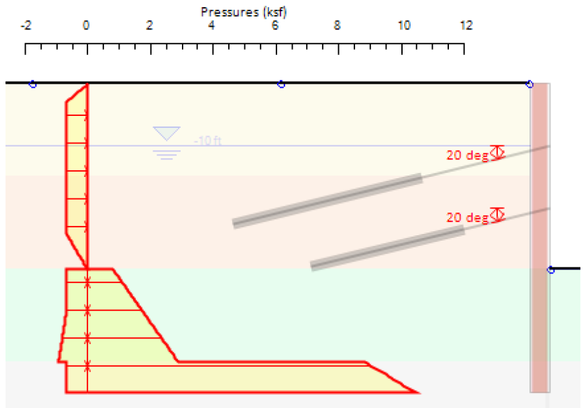
Two-Step Rectangular Pressures



WMATA Pressures

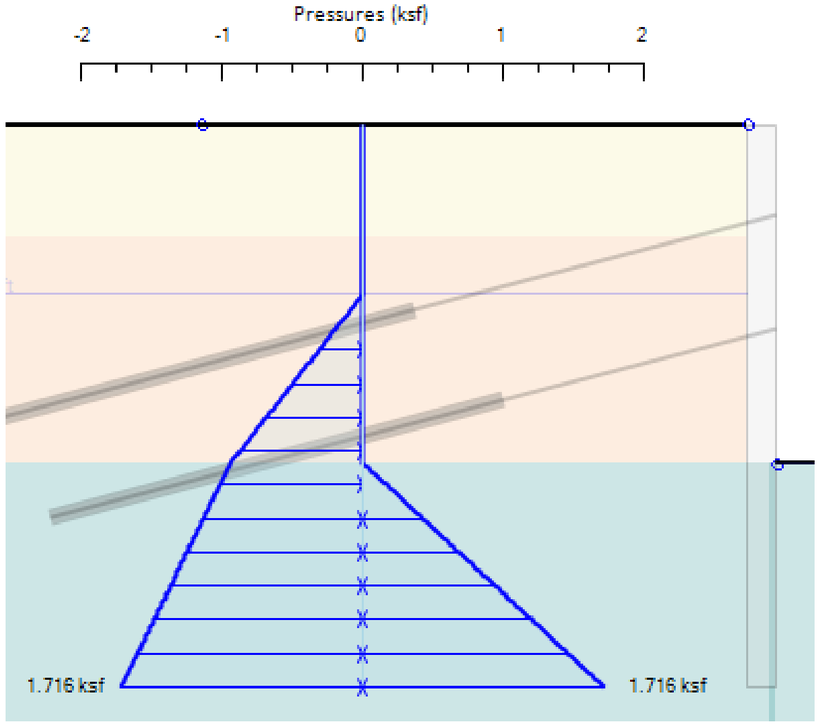


New York City DEP Pressures

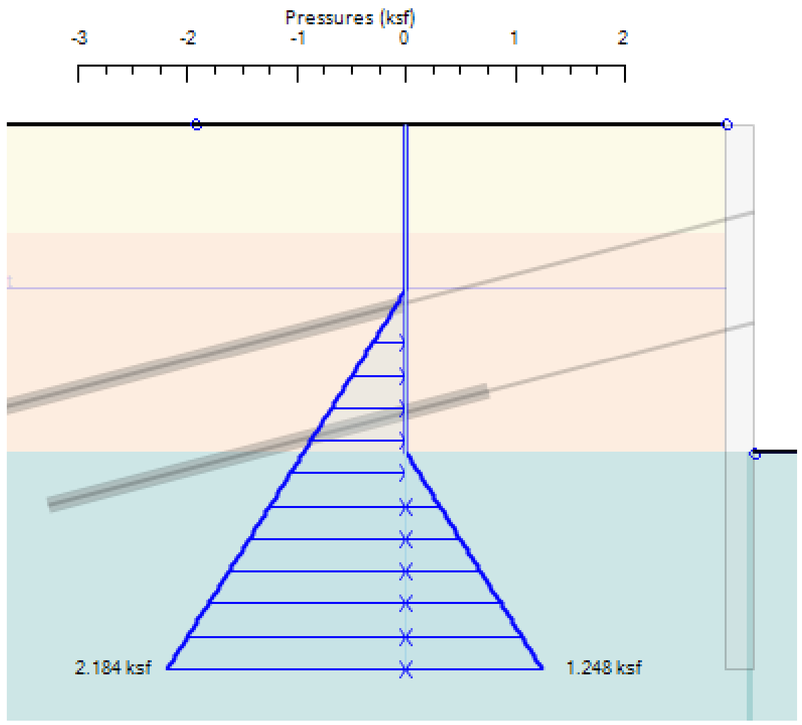


Water Pressure Methods

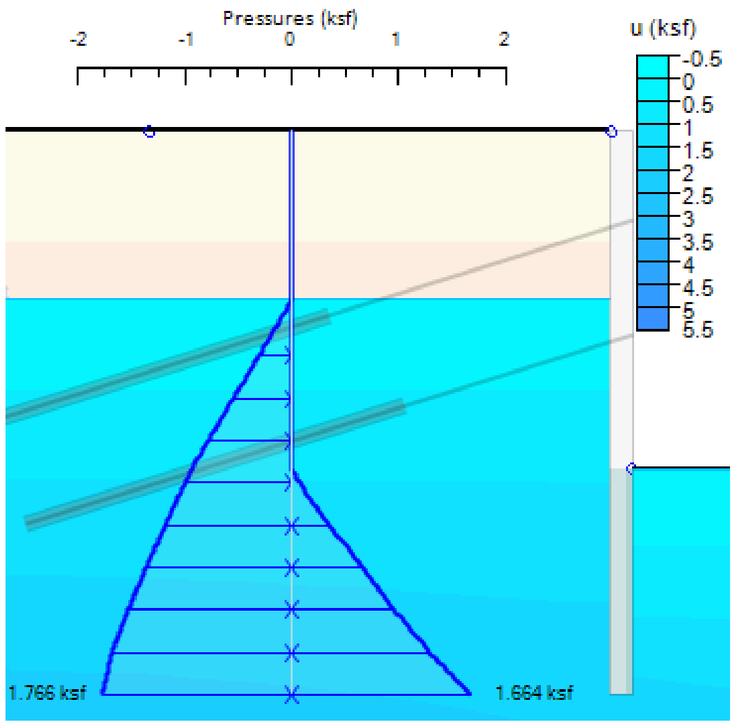
Simplified Flow



Hydrostatic



Full Flownet Analysis



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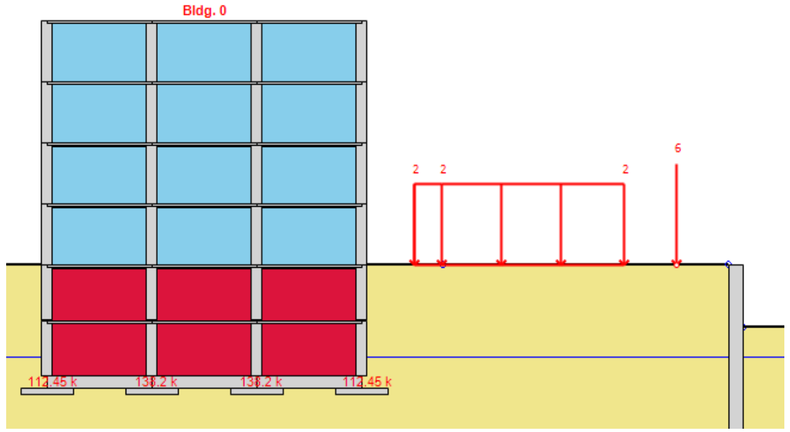
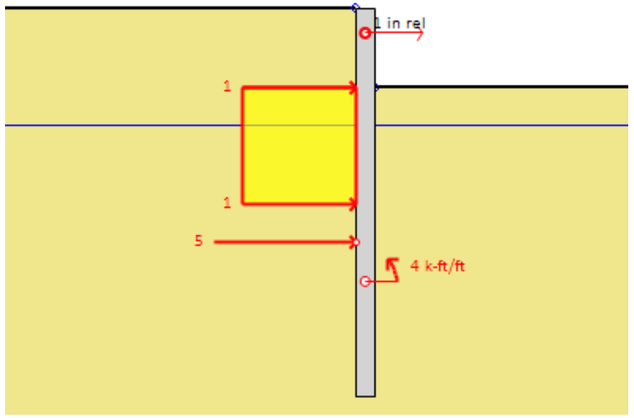
External Loads: Types & Pressure Methods



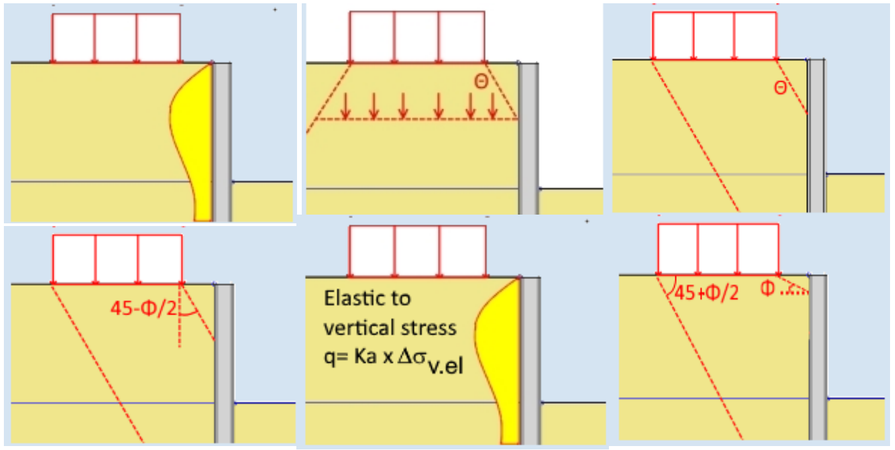
Loads on ground surface:

- ✓ Strip surcharges
- ✓ Linear loads
- ✓ 3D loads (buildings, footings, 3D surface loads



Loads on the wall:

- ✓ Strip surcharges
- ✓ Linear loads
- ✓ External moments
- ✓ Prescribed displacements



Load modeling options:

- ✓ Elasticity equations
- ✓ Two-way distribution angle
- ✓ One-way distribution angle
- ✓ One-way distribution angle from soil friction
- ✓ Elasticity to vertical stress x Ka (or Ko)
- ✓ CIRIA Special Pub 95 - 1993

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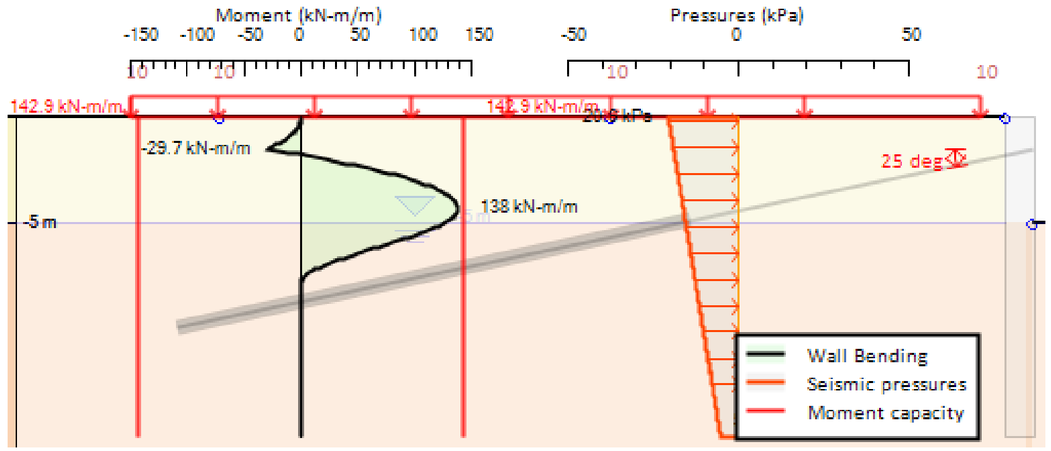
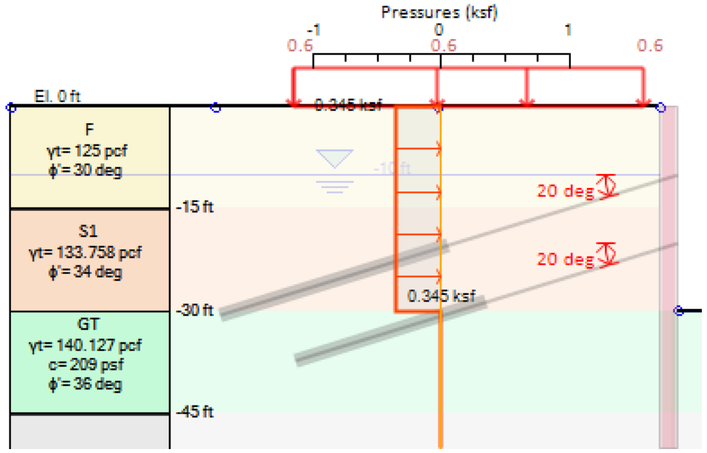
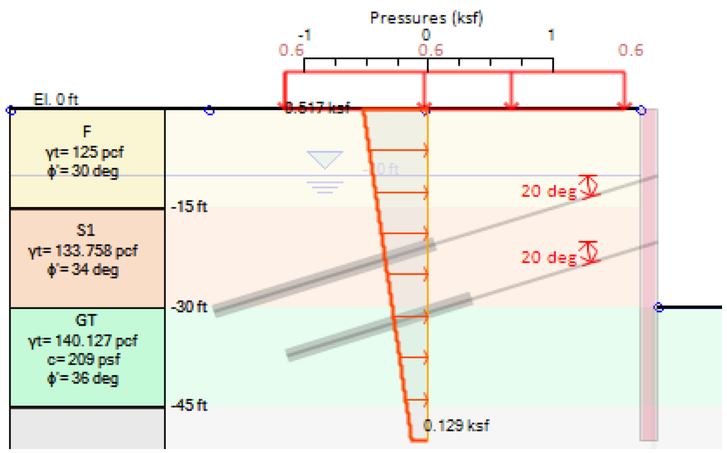
Seismic Pressure Methods







Procedure in DeepEX

- Define Seismic Accelerations Ax and Az
- Select Seismic Pressures Calculation Method
- Select a Seismic Design Standard

Seismic Pressure Methods

- ✓ Semirigid
- ✓ Mononobe-Okabe (frictional soils)
- ✓ Wood Automatic
- ✓ Wood Manual

Semirigid Method

- Total Vertical Stress at Bottom of Wall x B
- B = 0.75 in DeepEX
- Rectangular Pressure Diagram

Mononobe-Okabe Method (Frictional Soils)

- Extension of the Coulomb Static Theory
- Accelerations added to a Coulomb Wedge
- Seed & Whitman (1970) Seismic Thrust Redistribution
- Inverse Trapezoid Pressure Diagram

Cantilever Wall Analysis Concepts

Fixed earth method

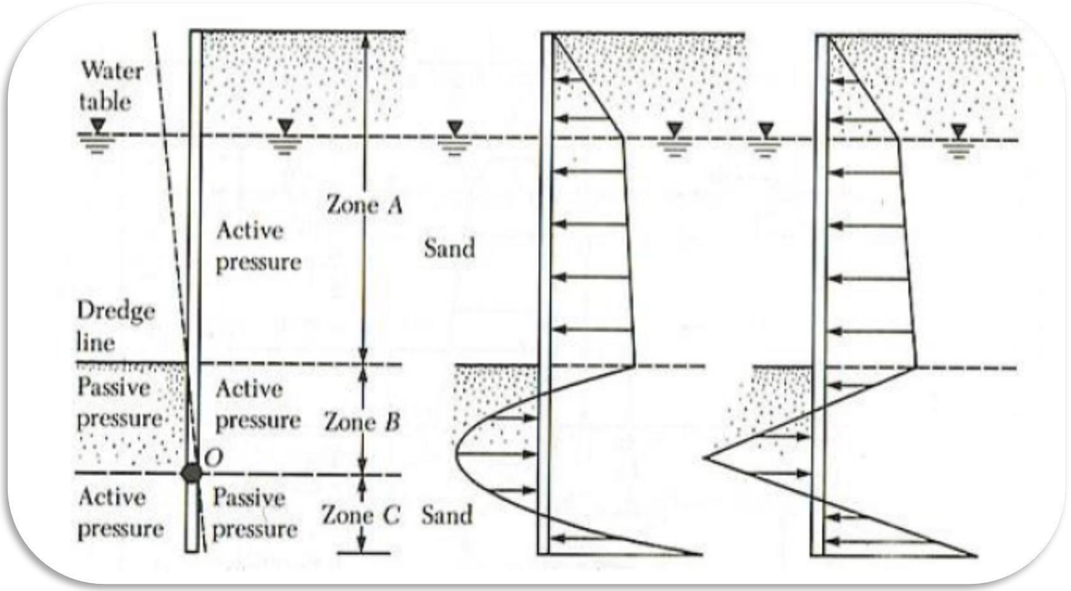
Balances out Moment and Shear

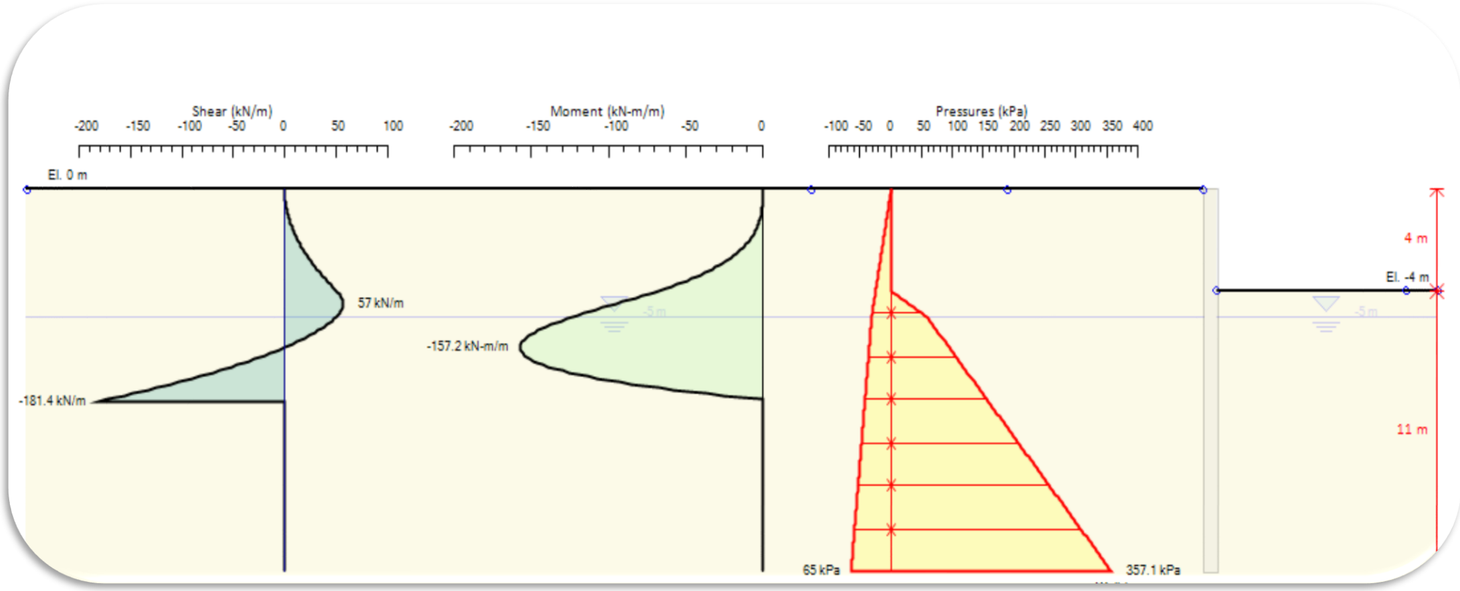
Free earth method

Balances out Moment - Shear not balanced

Increase length by 1.2 to get FS 1.0

Then apply additional safety factors





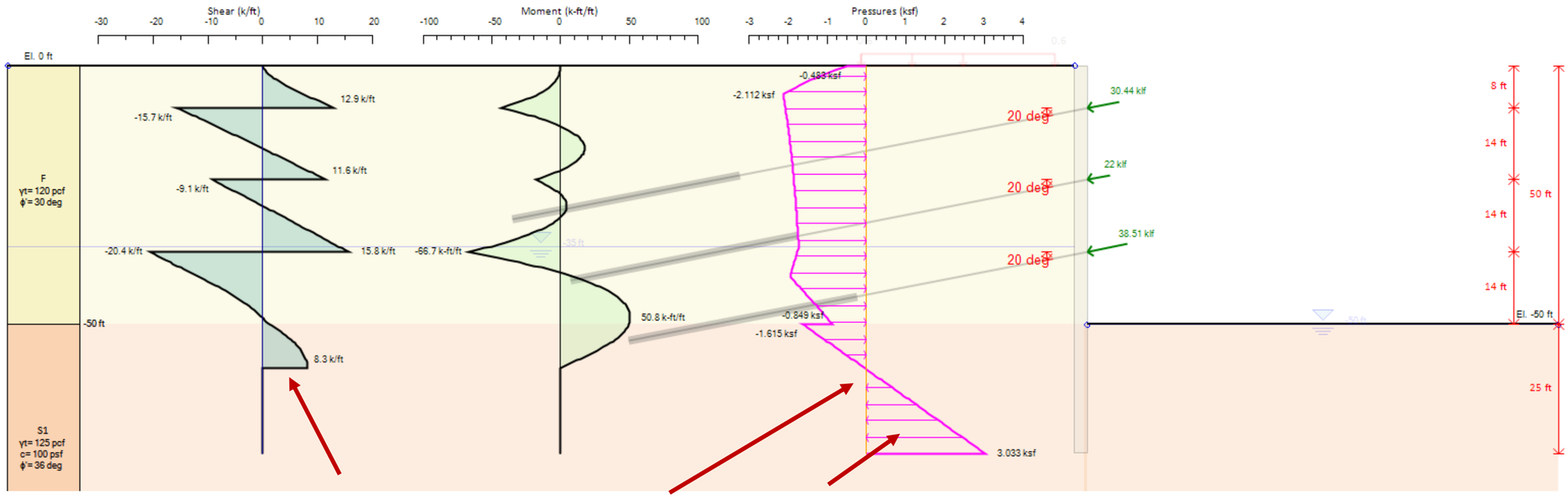
Beam Analysis: Blum's Method

Pinned supports - continuous beam

Point of zero net soil shear below subgrade.

Use point of zero shear as a virtual support.

Shear Moments Net loading



Reaction for embedment Fxb

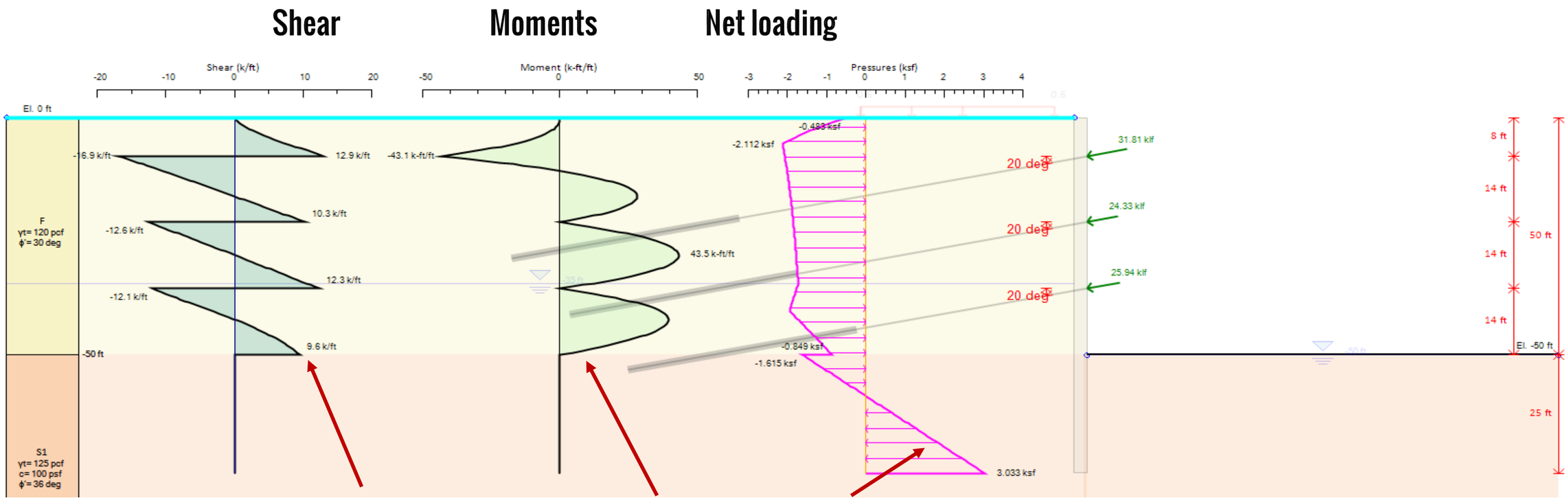
Virtual support

Available resistance Rx

$$FS.passive = \frac{Rx}{Fxb}$$

Beam Analysis: FHWA Simple Span Method

Pin support at excavation base, simple spans



Reaction for embedment Fxb

Virtual support

Available resistance Rx

$$FS.passive = \frac{Rx}{Fxb}$$

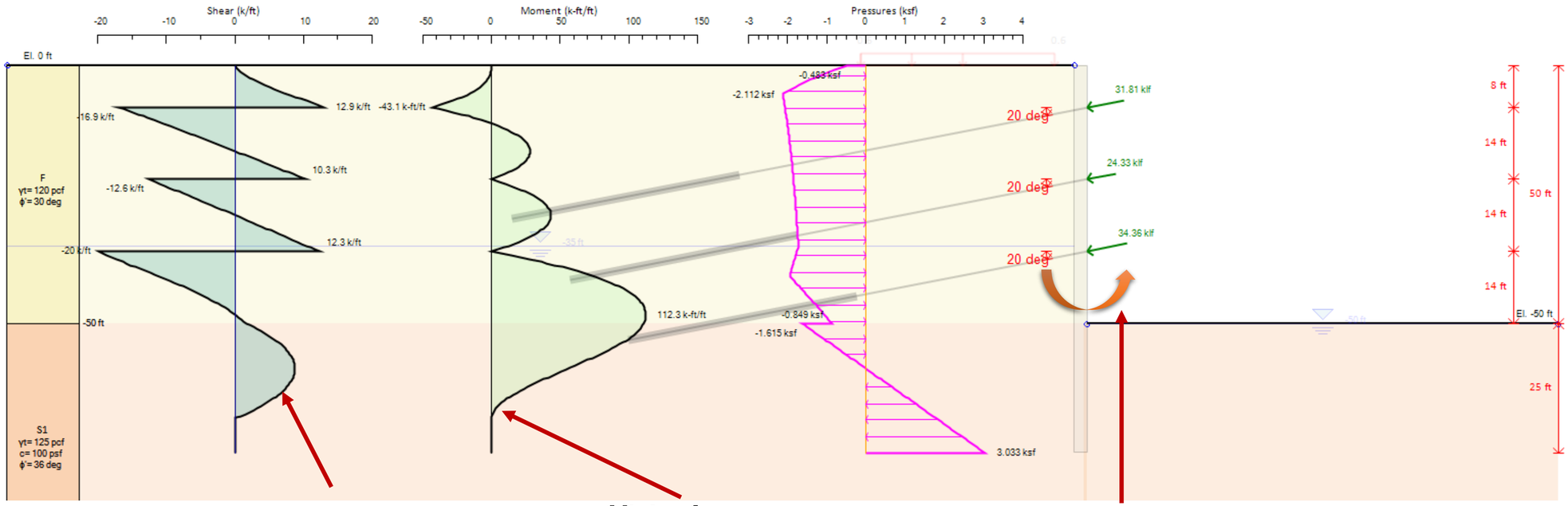
Beam Analysis: CALTRANS Approach

Pinned supports - simple span

Base at point of zero moment below bottom support

Shears and moments balance out

Shear Moments Net loading

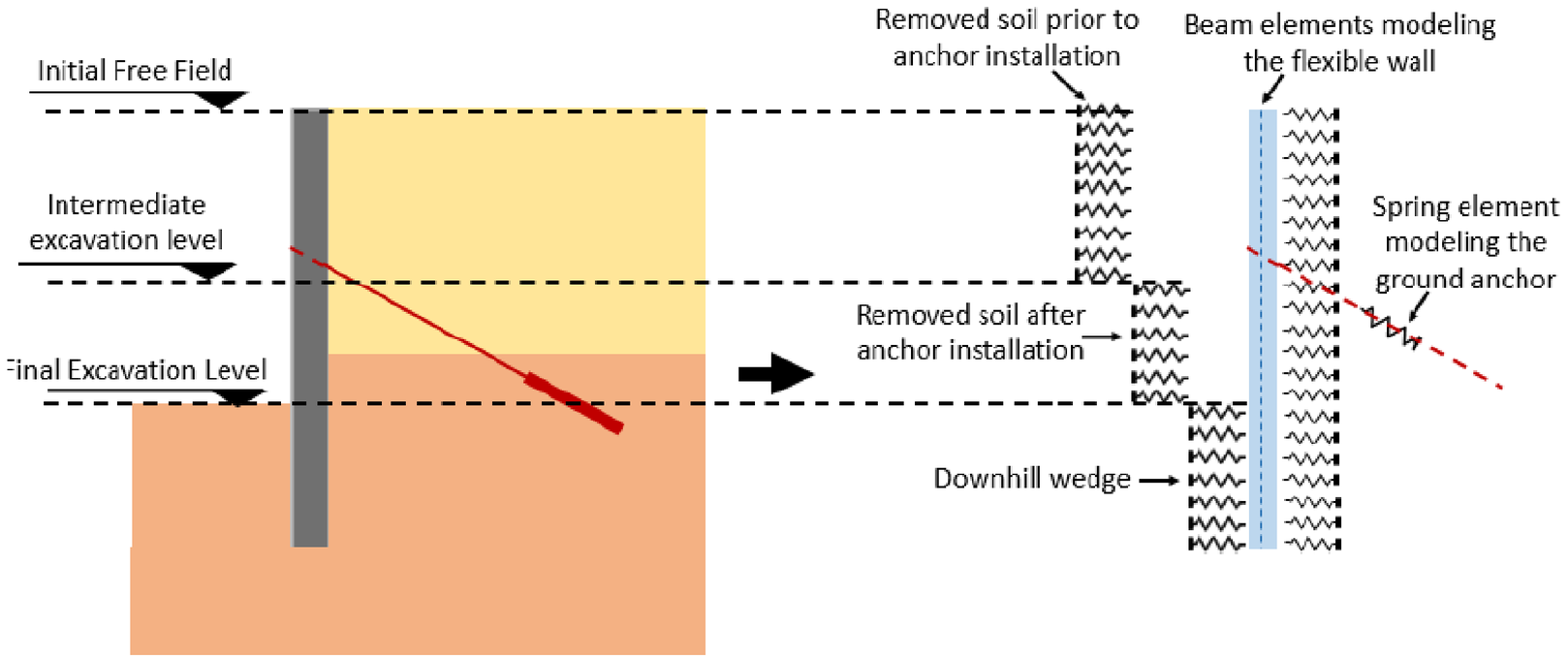


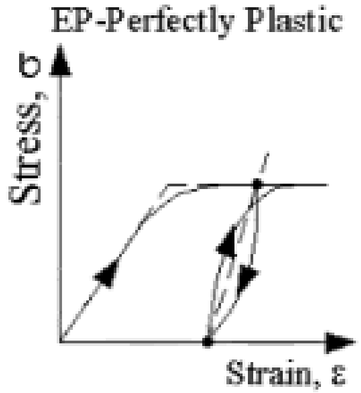
No Embedment Reaction

Virtual support

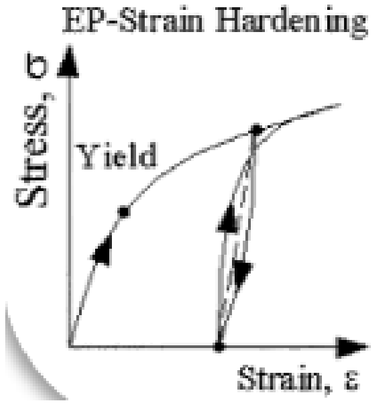
$$FS.\text{rotation} = \frac{Fresist}{Fdrive}$$

Non-Linear Analysis Concept (Soil Springs)





Elastoplastic model



Exponential model

Soil Models

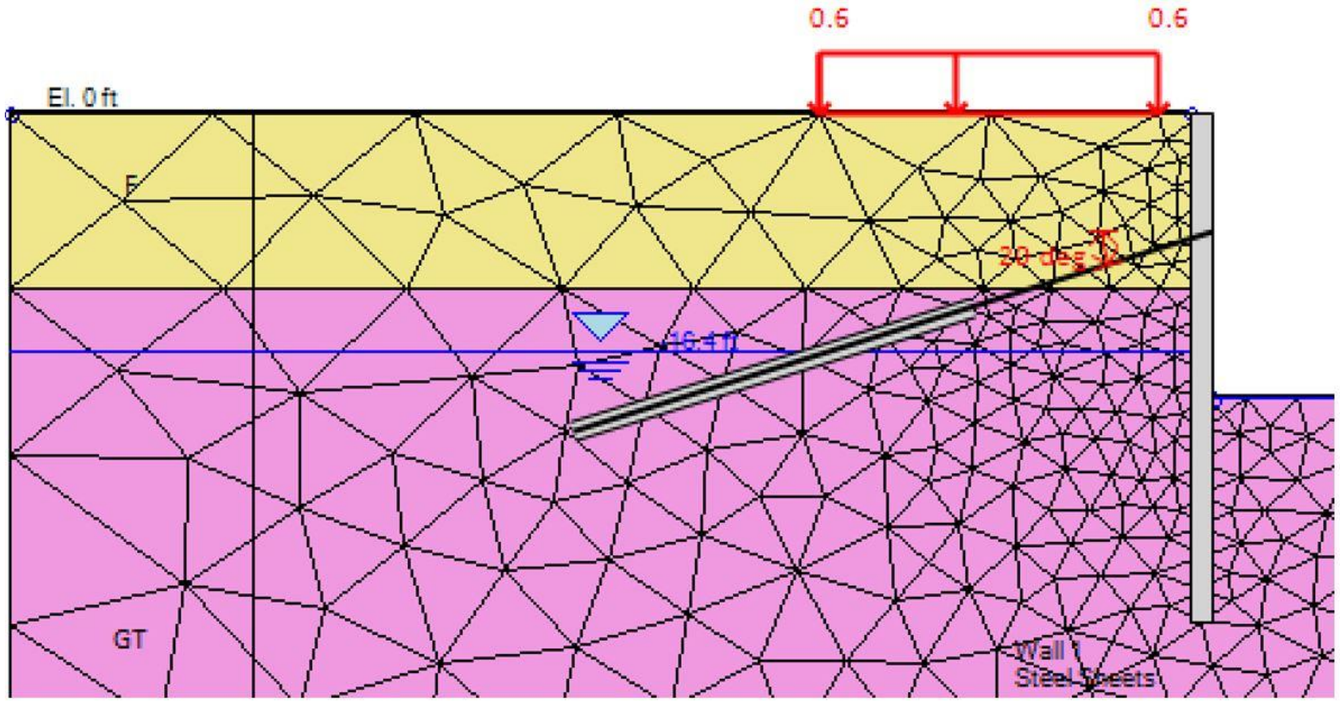
- Linear elastic perfectly plastic
- Exponential (Hyperbolic)

$$E = Evc[(\alpha_v \sigma'_v + \alpha_H \sigma'_h)/pref]^n$$

- Subgrade modulus
- Small strain hardening

Reloading stiffness linear 3 to 5 x loading E

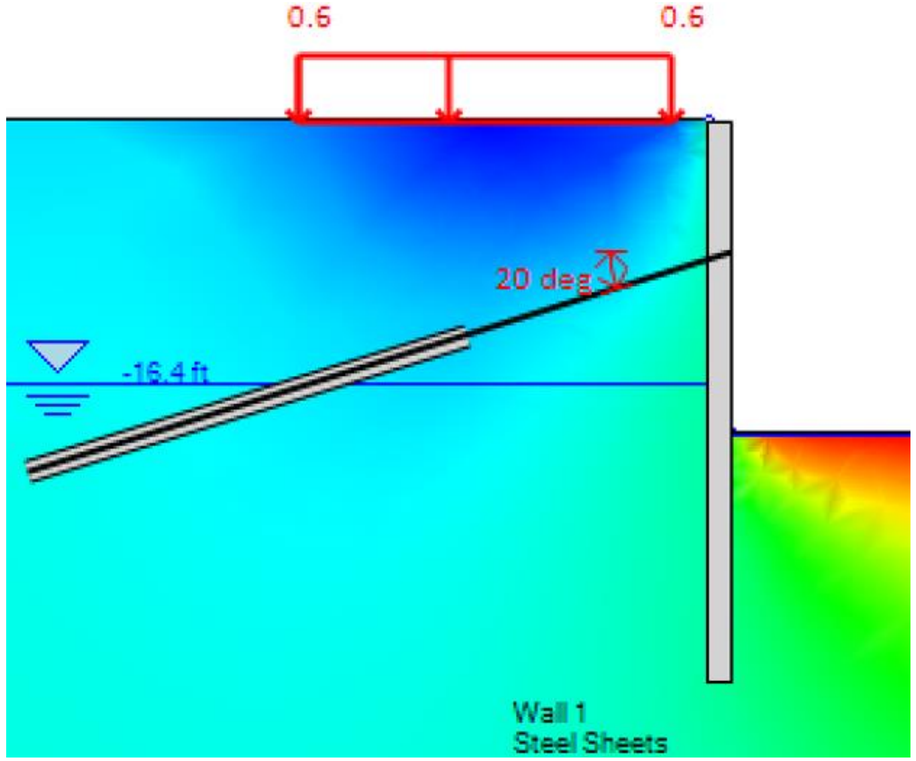
Finite Element Analysis Concept (FEM)



- ✓ Moments and reactions calculated with Finite Elements
- ✓ Consider full soil-structure interaction
- ✓ Calculate surface settlements
- ✓ Design Tiedowns, Foundation Piles and Steel Columns

Soil Models:

- ✓ Elastoplastic Model (Mohr - Coulomb)
- ✓ Exponential (Hyperbolic) Model (approximate solution)
- ✓ Exponential (Hyperbolic) Model (complete solution): Soil hardening model



Projects Designed with DeepEX

Sweet Home Alabama! Uncommon Auburn

Courtesy of Russo Construction

Southbank Soil Nail Wall, Tempe AZ

PB&A + Deep Excavation

Secant Pile Wall For Maspeth Avenue Station, NY

Courtesy of Skanska

Javits Center Expansion, NY

EE Cruz + Deep Excavation

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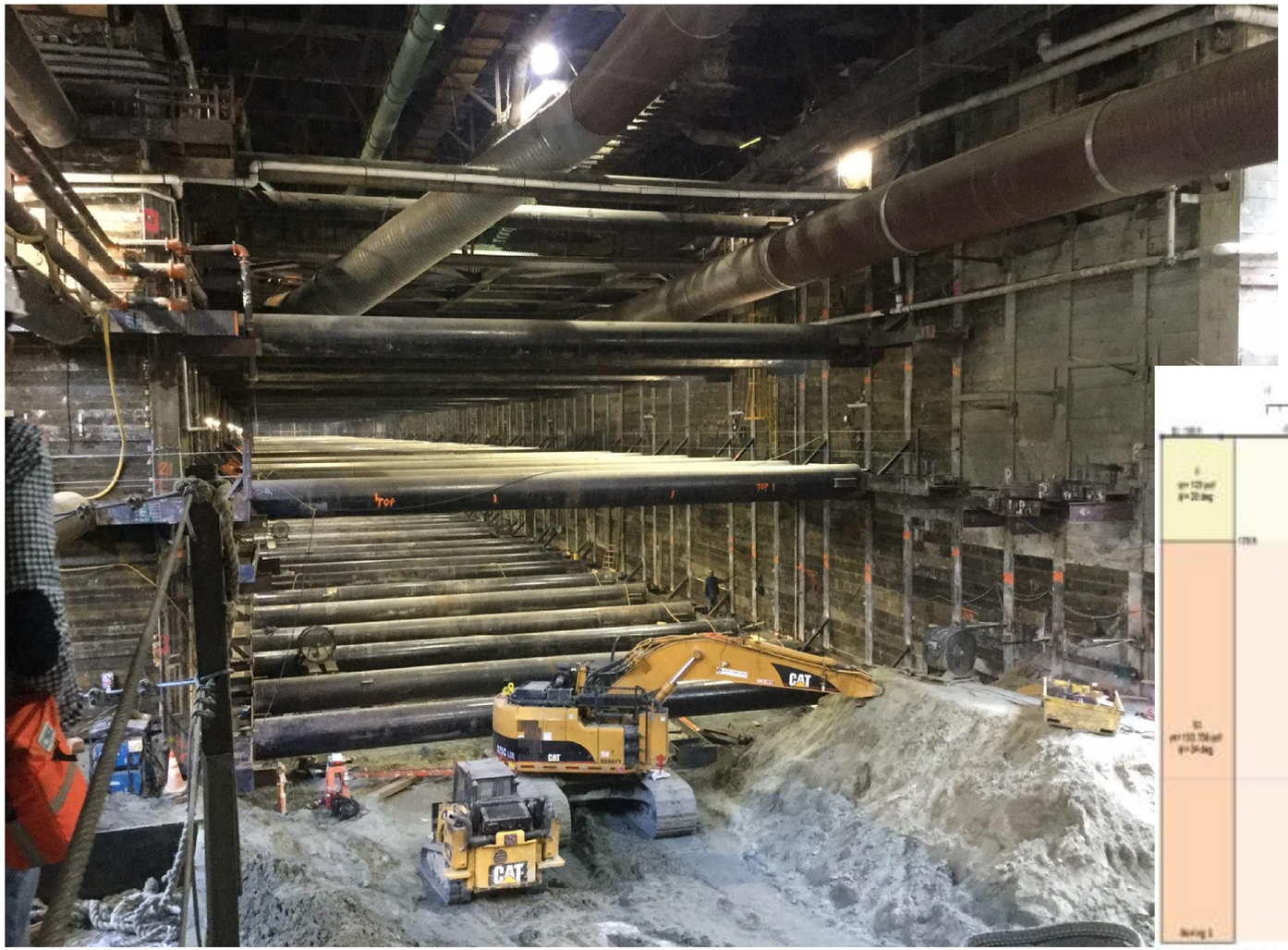
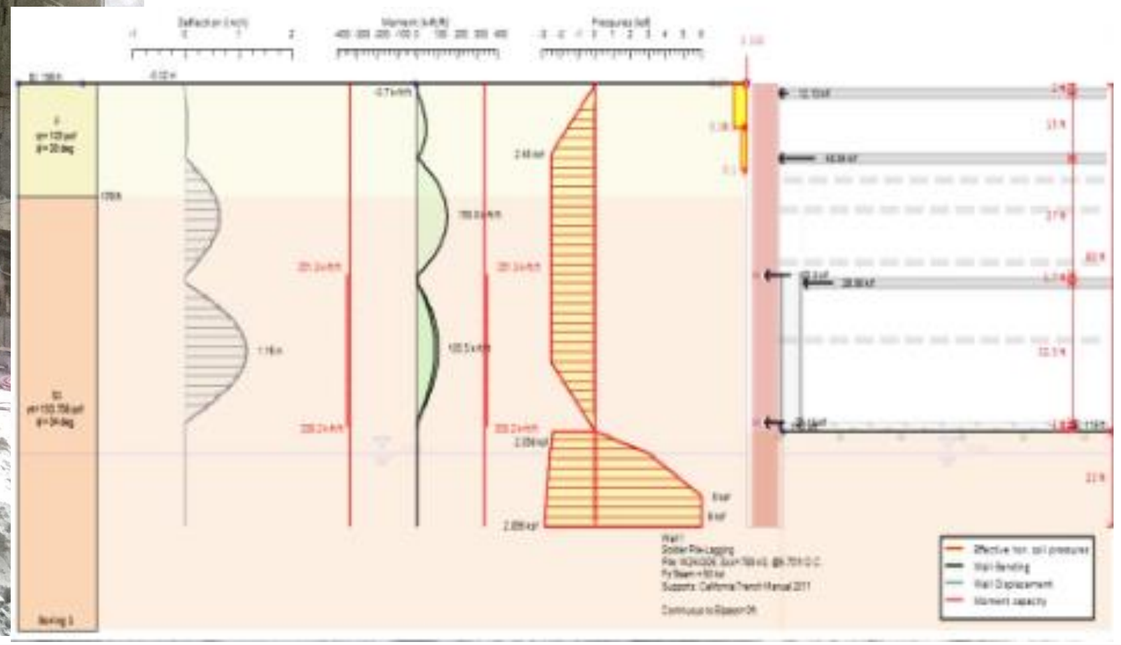
Sample DeepEX Projects

LaBrea Metro Station, Los Angeles, California, USA

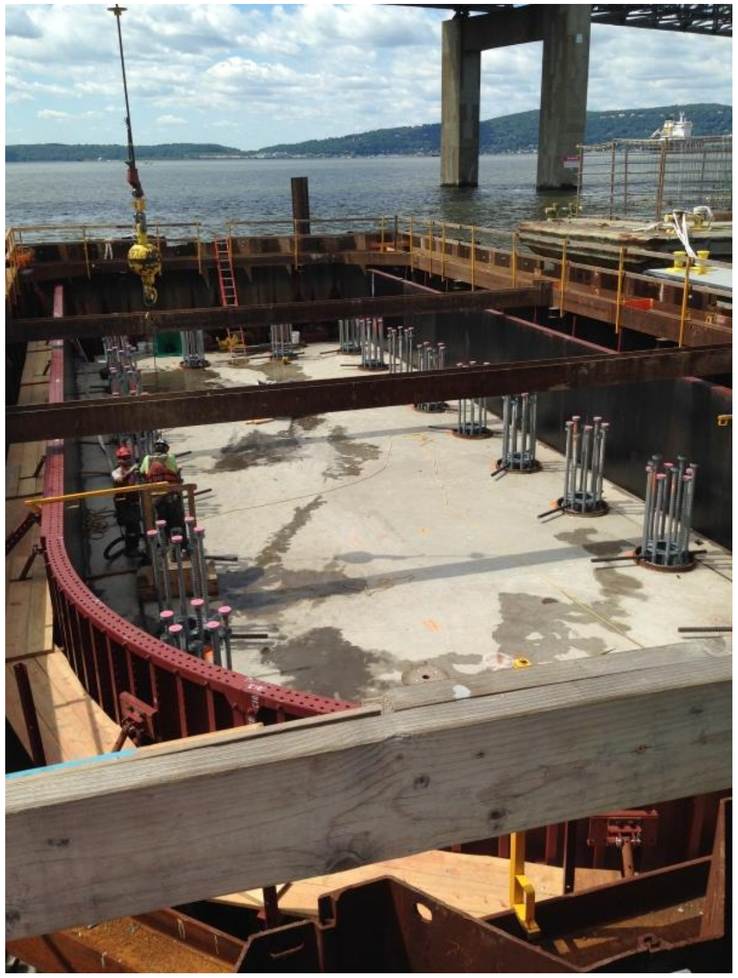


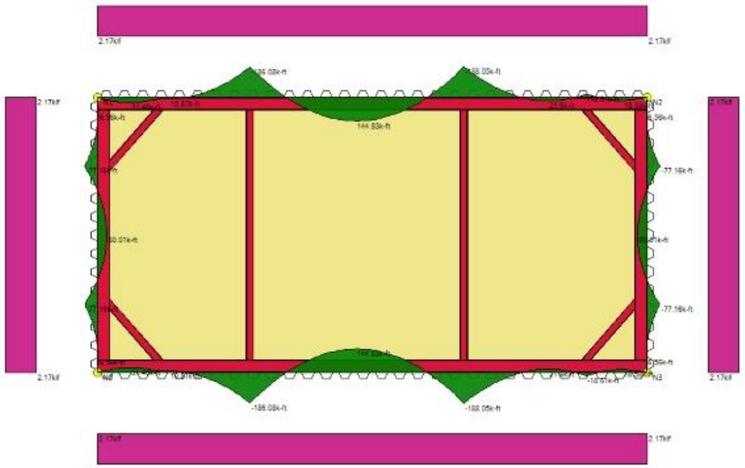
- ✓ 100 ft (30.5 m) Excavation
- ✓ Soldier Piles and Lagging
- ✓ Lateral Bracing (Struts)
- ✓ Full Design with DeepEX
- ✓ 5 Stations designed and under construction



Sample DeepEX Projects

New Tapan Zee Bridge Cofferdams, New York, USA





- ✓ $3.9 billion project
- ✓ 90x45ft (27.5x13.7m) Cofferdams
- ✓ Lateral Bracing (Struts)
- ✓ Full Design with DeepEX

Sample DeepEX Projects

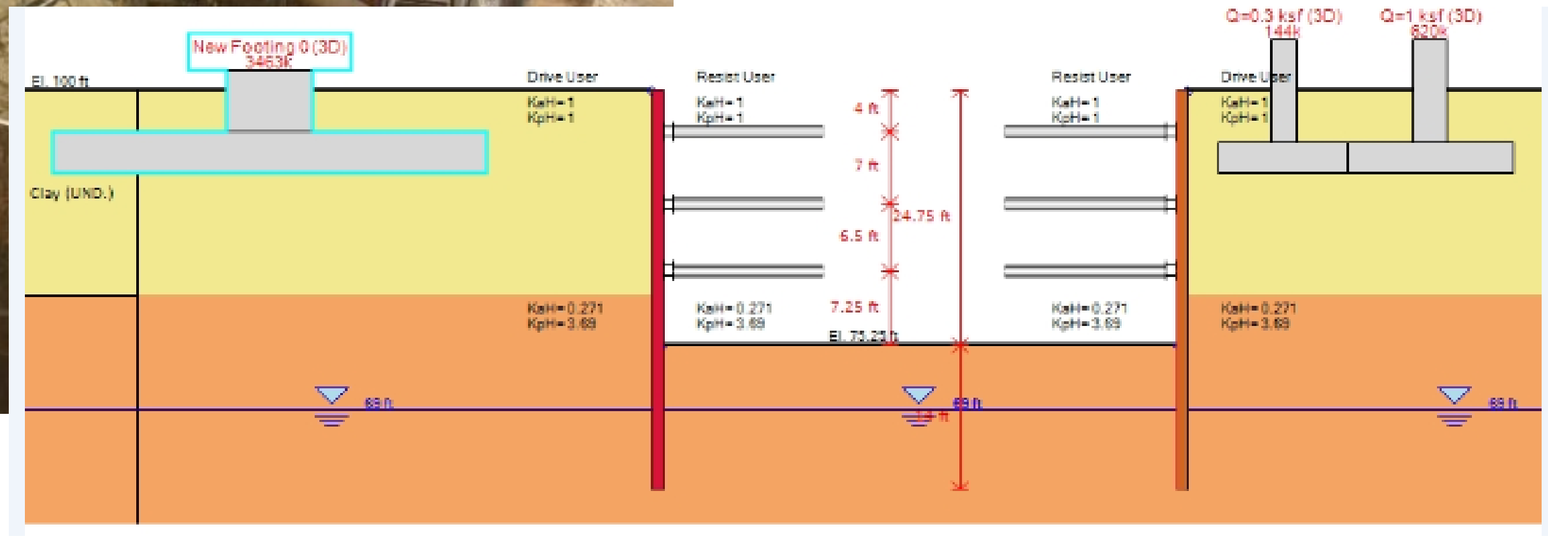
Soldier Pile Excavation Pits with Diagonal Struts and Tiebacks, Arkansas, USA

- ✓ 90 ft (27.5m) Excavation
- ✓ Soldier Piles and Lagging
- ✓ Pipe Struts
- ✓ 9 rows of Tiebacks

Sample DeepEX Projects

Soldier Pile Excavation Pits with Diagonal Struts, Arkansas, USA

- ✓ 24 ft (7.3m) Excavation
- ✓ Soldier Piles and Lagging
- ✓ Pipe Struts
- ✓ Full Design with DeepEX



Sample DeepEX Projects

All American Canal, Imperial Irrigation District, Yuma, Arizona

- ✓ Cofferdam
- ✓ Water Wall Design
- ✓ Water Depth up to 20’ (6m)
- ✓ Sheet Pile System
- ✓ Post Tension cable Ties
- ✓ Full Design with DeepEX

DeepEX
Shoring Design Software

Part 4

DeepEX Versions & Training Materials

- ✓ Customizable Packages
- ✓ Powerful Additional Modules
- ✓ Personal Technical Support
- ✓ Videos, Examples, Manuals

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Versions & Modules

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Examples & Videos

Live Presentations:

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Schedule a Free Web Demo

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DeepEX
Shoring Design Software

Standard Packages & Additional Modules

Capabilities/Version DeepEX	2D	3D	3D City
Design of 2D Excavation Models	✓	✓	✓
Limit Equilibrium Analysis	✓	✓	✓
Non-Linear Analysis	✓	✓	✓
Slope Stability Analysis	✓	✓	✓
Export Sketches to DXF	✓	✓	✓
Soil Estimation - Statistical Analysis	✓	✓	✓
Cost Estimation	-	✓	✓
3D Models - 3D Frame Analysis	-	✓	✓
Steel Connections	-	✓	✓
3D Model Holograms (HoloDeepEX)	-	✓	✓
Building Damage Assessment	-	✓	✓
Finite Element Analysis (2D FEM)	O	✓	✓
3D Finite Element Analysis (3D FEM)	-	O	✓
Pile Abutments	O	O	✓
Sea Walls - Quay Walls - Wave Pressures	O	O	✓
MSE Walls	O	O	✓
Gravity Walls	O	O	✓
Citywide Damage Assessment	-	O	✓
Integration with Monitoring Data	-	O	✓
Deep Maintenance (12 Months)	✓	✓	✓

O: Optional module

- ✓ Single Licenses (activated in specific devices)
- ✓ Network Solutions
- ✓ 1 Year of full Technical Support
- ✓ Annual Maintenance options (after the first year)
- ✓ Discounts for Additional Licenses
- ✓ Additional Modules can be purchased and activated at any point in any software package

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