

**Bentley**<sup>®</sup>  
Advancing Infrastructure



## PLAXIS<sup>®</sup> 2D

The Most-used Application for Geo-engineering

PLAXIS 2D is a powerful and user-friendly finite-element package intended for 2D analysis of deformation and stability in geotechnical engineering and rock mechanics. PLAXIS is used worldwide by top engineering companies and institutions in the civil and geotechnical engineering industry. Applications range from excavations, embankments, and foundations to tunneling, mining, and reservoir geomechanics. PLAXIS is equipped with a broad range of advanced features to model a diverse range of geotechnical problems, all from within a single integrated software package.

### User-friendly, FE Package

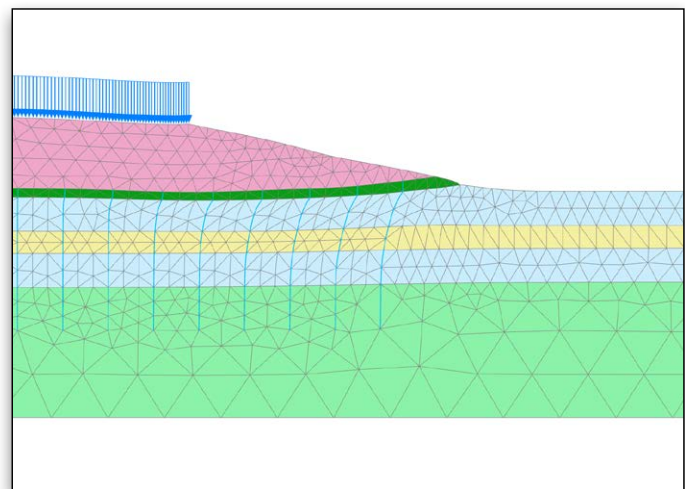
PLAXIS 2D add-on modules include PlaxFlow, Dynamics, and Thermal. PlaxFlow excels at making complex 2D groundwater flow analysis easy, while Dynamics offers reliable and comprehensive dynamic load modeling. The Thermal module is necessary when the effects of heat flow on the hydraulic and mechanical behavior of soils and structures need to be taken into account in geotechnical designs with PLAXIS. These modules work together to build a powerful and user-friendly finite element package intended for two-dimensional analysis of deformation and stability in geotechnical engineering and rock mechanics.

The software is equipped with a broad range of advanced features to model a diverse range of geotechnical problems all within a single package. The geometry is modeled via predefined structural element types and loading types using CAD-like drawing capabilities that lead to fast and efficient finite-element model creation. A large range of material models is offered to accurately model the behavior of various soils and rock types, which together with robust calculation procedures provide realistic assessment of stresses and displacements.

The PLAXIS Output program consists of a full suite of visualization applications to check details of the underground soil-structure model for powerful and versatile post processing. Python based scripting facilities are available to couple PLAXIS 2D to other software applications.

### Fast and Efficient FE Model Creation

The user-friendly PLAXIS interface guides users across several modes to efficiently create models with a logical geotechnical workflow. The soil mode allows definition of multiple boreholes to create any complex soil profile or geological cross-section. In the Structures mode, structural elements, like piles, anchors, geotextiles, and prescribed loads and displacements can be defined. It is also possible to import geometry from CAD and BIM files. PLAXIS 2D contains a Tunnel Designer



*Stability of embankment on soft soil, reinforced by rigid inclusions.*

wizard to quickly create and edit tunnel cross-sections and loading conditions. The Mesh mode features automatic and manual mesh refinements, automatic generation of irregular and regular meshes and capabilities to inspect the mesh quality.

### Realistic Assessment of Stresses and Displacements

The Staged Construction mode allows users to accurately model the construction process by activating and deactivating soil clusters and structural elements in each calculation phase. Calculation types offered, including plastic, consolidation, dynamic using the Dynamics module, and safety analysis allow PLAXIS to be used in a broad range of geotechnical problems. PLAXIS offers various constitutive models ranging from simple linear to advanced highly nonlinear models, so that a wide range of soil and rock behavior can be simulated. The well-proven and robust calculation procedures ensure that calculations converge and provide accurate results. With multicore calculations and a 64-bit kernel, PLAXIS can deal with the largest and most complex models.

### Powerful and Versatile Post Processing

The versatile Output program offers various ways to display forces, displacements, stresses, and flow data shown in contour, vector, and iso-surface plots. Cross-section capabilities allow areas of interest to be inspected in more detail, and data can be copied from tables for further plotting purpose using other software. The Curve manager enables the creation of graphs that can plot various results across a selection of calculation phases.

## System Requirements

### Operating System

Windows 7 Professional 64-bit  
Windows 8 Professional 64-bit  
Windows 10 Pro 64-bit

### Graphics Card

Required: GPU with 256 MB  
OpenGL 1.3

Bentley recommends avoiding simple onboard graphics chips in favor of a discrete GPU from the Nvidia GeForce or Quadro range with at least 128-bit bus and 1 GB of RAM, or equivalent solution from ATI/AMD.

### Processor

Required: Dual Core CPU

Recommended: Quad Core CPU

### Memory

Recommended for 2D: minimum 4 GB.  
Large projects may require more.

### Hard Disk

Minimum 2 GB free space on the partition where the Windows TEMP directory resides, and 2 GB free space on the partition where projects are saved. Large projects may require significantly more space on both partitions.

For best performance, ensure that the TEMP directory and the project directory reside on the same partition.

### Video

Required: 1024 x 768 pixels,  
32-bit color palette

Recommended: 1920 x 1080 pixels,  
32-bit color palette

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## PLAXIS 2D At-A-Glance

### Modeling

- Spatial variation of preconsolidation
- Tunnel deconfinement
- CAD export\*
- Nonlinear geogrids: Elastoplastic (N- $\epsilon$ ) and Viscoelastic (time-dependent)
- Cross and parallel permeability in interfaces
- Polar and rectangular array\*
- Nonlinear embedded beam row (M- $\kappa$  diagrams)
- Easy definition of rock bolts in Tunnel Designer\*
- Unlimited combinations of point forces and distributed loads

### Material Models

- Concrete\*
- UDCAM-S with cyclic accumulation and optimization tool\*
- User-defined soil models\*
- Soft soil (with and without creep)
- Sekiguchi-Ohta, viscid and inviscid\*
- NGI-ADP\*
- Jointed rock
- Hoek-Brown with parameter guide\*

### Calculations

- Field stress initial calculation type\*
- Well-proven and robust calculation procedures
- Multicore computing\*
- Include or exclude soil clusters and/or structural elements in safety analysis
- 64-bit calculation kernel
- Facilities for steady-state groundwater flow calculations, including flow-related material parameters, boundary conditions, drains, and wells
- Distinguish between a plastic calculation, consolidation, and safety analysis
- Automatic regeneration of construction stages

### Results

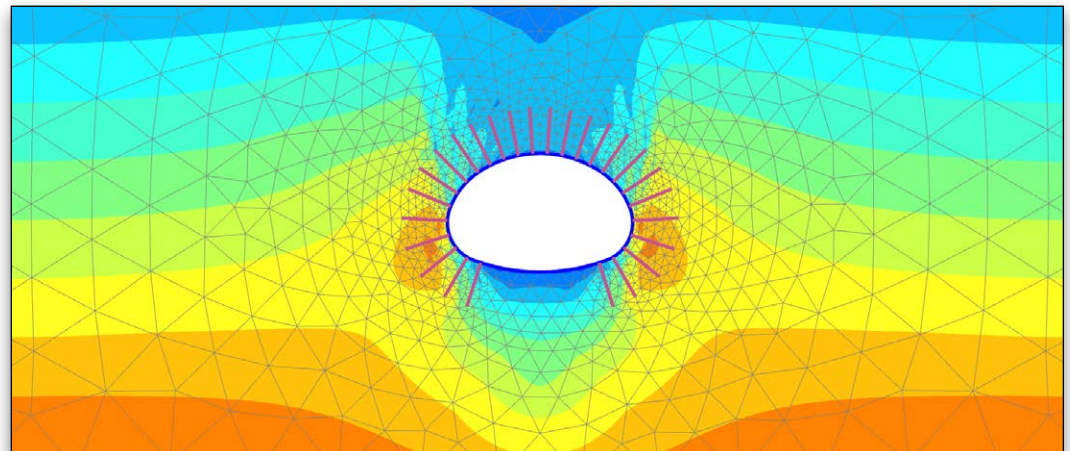
- Load-displacement curves
- Use the Output command line to display plots, or save plots with user-defined resolution
- Select number of significant digits displayed
- PLAXIS 2D Viewer
- Automatic centerline extraction for structural forces plots\*
- Structural forces in Volumes (Tunnel lining, retaining wall)
- Resulting Force View
- Preview Calculation results
- Plot Annotations

### Usage

- Rock-mass response and surface settlements due to tunneling, mining, or reservoir depletion
- Slope stability and seepage analysis for large earth dams, tailing dams, embankments, and pit mines
- Predicting differential settlements of buildings adjacent to excavation pits
- Stability of and seepage into excavation pits, lateral displacements of diaphragm walls
- Calculate necessary consolidation time for pore pressure dissipation in undrained loading problems
- Bearing capacity and foundation settlement analysis for high-rise buildings, LNG tanks, and other structures

### Subscription Entitlement Service Supports

- Provides a universal ID to link together all activity within Bentley applications
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*NATM tunnel with rockbolts.*

\*Some features are dependent on product level or select entitlement