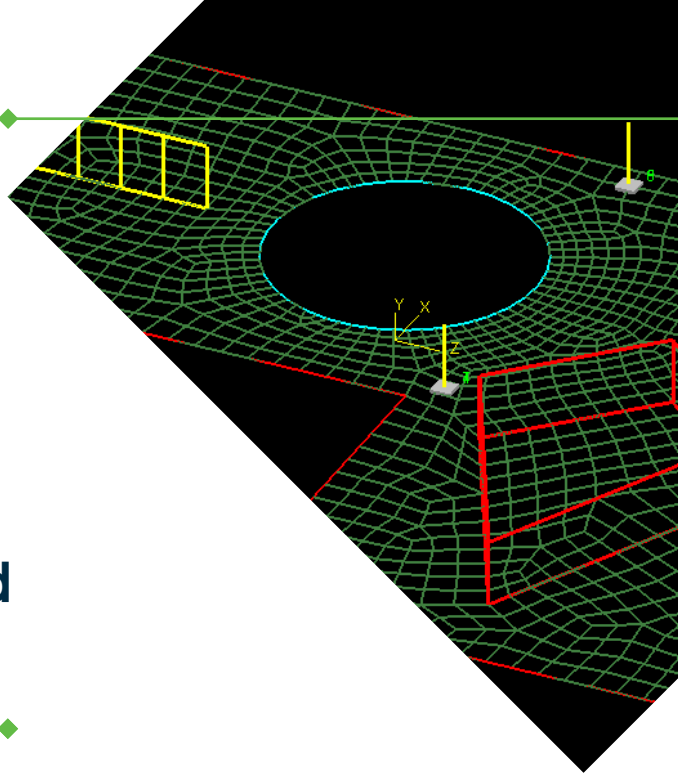
Bentley®
Advancing Infrastructure

PRODUCT DATA SHEET



STAAD® Foundation Advanced

Foundation Analysis and Design Software

STAAD Foundation Advanced is software for the analysis and design of foundations for buildings as well as plant structures, such as horizontal and vertical vessels.

INTEGRATED ENVIRONMENT FOR FOUNDATION DESIGN

The software provides three modes of operation – a general mode for superstructure data imported from STAAD.Pro® or Microsoft Excel or is user-specified; a plant mode for vertical and horizontal vessels, and self as well as mechanically anchored tanks; and a wizard-based mode for quick and easy data input for simple foundation types.

The foundation types that can be designed include isolated and combined footings, pilecaps, mat foundations, and annular ring wall foundations for self and mechanically anchored tanks. Other capabilities include analysis of drilled piers for vertical and lateral loads, vibration analysis for machine foundations, automatic load (wind and seismic) generation for vessel structures, and load combination generation capabilities.

Output of the designs is presented in the form of calculation reports with footing sketches, graphs, and references to the relevant sections of the design codes.

OPTIMIZES FOUNDATION DESIGN

STAAD Foundation Advanced supports a number of concrete codes: ACI 318 (2014, 2011, and 2005 editions), Indian IS-456-2000, Eurocode EN 1992-1-1-2004, Australian AS3600-2018, Chinese GB 50007-2011, Canadian A23.3-2019, and BS-8110. The PIP STC 01015 code is implemented for equipment foundation load generation and the API 650 and ACI 351.3R-04 standards are used for tank foundations and machine foundation vibration analysis.

Checks performed include determination of the overall safety from the standpoint of soil-bearing pressures, overturning and sliding stability, flexure, one-way and two-way shear limit states for concrete, pedestal design, and more. The adequacy of existing foundations of known sizes can be checked, and the software can recommend optimal sizes for some of those foundation types.

The program's graphical capabilities enable engineers to view displaced shapes, stress and moment contours, soil pressures, and reinforcement layout.

INTEGRATES WITH STAAD.PRO, ITWIN®, AND MICROSOFT EXCEL

STAAD Foundation Advanced is tightly integrated with STAAD.Pro. Other modes of data exchange include iTwin and Microsoft Excel. A STAAD.Pro file that is successfully analyzed can be imported into or exported to STAAD Foundation Advanced, while automatically bringing in all column positions (and/or plates), column cross section dimensions, support reactions, and loads. Changes made to the column positions or loads can be re-imported to re-evaluate the substructure designs. Data exchange through Microsoft Excel consists of import and export of input data and export of detailed output.

FINITE ELEMENT METHOD (FEM) ANALYSIS FOR MAT FOUNDATIONS

For mat foundations, STAAD Foundation Advanced provides a physical object-based modeling environment that offers a great deal of flexibility in terms of the kind of mat geometries that can be created – irregular shapes, thickened regions, openings of various shapes, etc. A built-in mesh generator simplifies the task of generating a STAAD.Pro finite element (FE) mathematical model with automatic generation of compression-only spring supports for soils and springs for piles. Physical loading objects facilitate quick and easy methods for creating irregular area loads, circular line/area loads, quadrilateral loads, straight line loads, and point loads on space.

The FE model is analyzed using STAAD.Pro's analysis engine. In uplift situations, the area of the mat in contact with the ground is included in the output. The software performs checks for flexure and punching shear, and recommends reinforcement bar sizes and spacing. Capacity checks for user-specified bar arrangements are also available.

For machine foundations, STAAD Foundation Advanced generates solid elements and dynamic loads based on user input. These too are analyzed using the STAAD.Pro analysis engine. Checks on deflections and comparisons of frequencies as per the ACI 351.3R are also performed.

PLAN, ELEVATION, AND SECTIONAL VIEWS

STAAD Foundation Advanced generates drawings for plan, elevation, and sectional views with rebar marks. Schedule drawings provide a summary table for design results. GA drawings include all the footings designed in the project with grid lines and grid marks that help identify interference. Drawings can be exported to DXF or DWG formats.

SYSTEM REQUIREMENTS

MINIMUM: 1280 x 1024 resolution, 300 MB free space, Microsoft Windows 8 or 10, Intel Pentium or AMD Athlon

RECOMMENDED: 500 MB of RAM, 2 GB free space, OpenGL 3D graphics supported

STAAD Foundation Advanced At-A-Glance

GENERAL FOOTINGS

- Intuitive graphical user interface; the workflow is categorized and arranged to flow from top to bottom
- Foundation project environment that includes isolated, combined, strap, pile cap, octagonal footing, mat, and rotating/reciprocating machine foundations; it connects all the modules through a global layer
- Tabbed view, navigator tree ribbon control and custom skin style
- Spreadsheet import/export integration with detailed output
- Physical mat foundation modeling environment that saves time and reduces errors by considering openings, control regions, physical beam, and column lines; provides an option for both triangular and quadrilateral plates
- Physical loading – including point load on space, irregular quadrilateral load, circular load, or line load that enables users to simulate physical loading conditions
- Wizard-based simplified input for rotating/reciprocating machine foundation that creates solid elements with dynamic loading
- Integrates with STAAD.Pro to import/export loadings, reactions, column positions; users can import any set of analyzed plates to design; tracks changes made in the STAAD.Pro model and can merge the changes with the STAAD Foundation Advanced file
- Graphics that help visualize output like displacements, stress on displaced shape, grade beam stresses, and entities such as plates and beams for a realistic, rendered view
- Automatic pile arrangement

OUTPUT

- DXF export of detailed and GA drawings
- Detailed structural drawings with customizable drawing options and labels
- Base pressure and plate stress color contours
- Step-by-step detailed calculation sheet with code clauses and equations to verify output
- To-scale dynamic sketches in calculation sheet
- GA drawings with grid marks to help identify interferences
- Bending moment and shear force graphs for combined footing embedded in calculation sheet for critical load case
- Printable bending moment and shear force graphs for combined footing

ANALYSIS AND DESIGN

- Support for both flexible and rigid methods; optimize footing dimensions
- FEM-based static analysis for mat foundation and dynamic analysis for machine foundation powered by the STAAD analysis engine
- Support for many load cases and load combinations
- User-defined reinforcing zones and blocks for optimal reinforcement arrangement
- Slab design along any cut line to simulate manual mat design techniques
- Pedestal design
- Analysis for partial uplift caused by biaxial bending for all footing types

DESIGN CODES

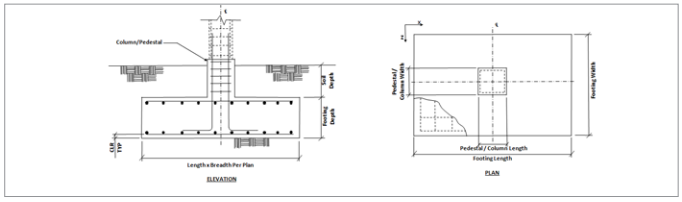
- United States – ACI 318-2014, 2011, 2005
- United Kingdom – BS 8110
- India – IS 456-2000
- Australia – AS 3600 2018
- Canada – CSA A 23.3-19
- Chinese – GB50007 2011
- Euro – EN 1992-1-1-2004

SPECIFIC FEATURES FOR PLANT FOUNDATIONS

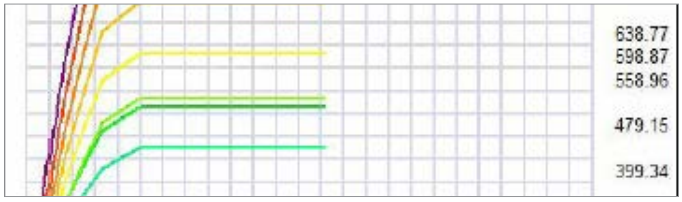
- Specific modules for the plant industry, such as vertical vessel foundation, heat exchanger foundation, annular ring tank foundation, and drilled pier analysis
- Generates load combinations automatically based on several country codes such as ASCE-7 and PIP STC 01015
- Generates wind load and zip-code-based seismic load automatically based on ASCE 7, IS 875, IS 1893
- Creates different configurations of vessel foundations

FOUNDATION TOOLKIT FEATURES

- Time-saving, wizard-based input for isolated footings, combined footings, pile cap arrangement and design
- Drilled axial pier module supporting API and FHWA 1999 and alternative Vesic method



Design of isolated footings for axial load and biaxial bending with partial uplift.



p-y curve generation for lateral analysis of drilled pier.

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