Bentley

STAAD.foundation V8*i*

SELECT Series 3
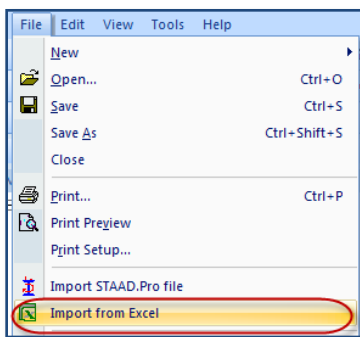Release 05.02

What's New in
STAAD.foundation 5.2

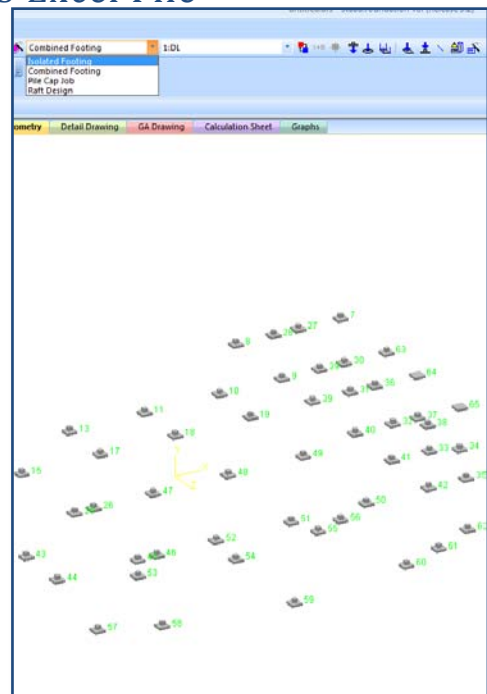# General Features

- ## Microsoft Office Excel Import

   With STAAD.foundation 5.2, a predefined Microsoft Excel file can be directly imported to the program. This feature can be used as flexible means to import geometry, loads, and other data from virtually any structural analysis & design software. By creating macros in Excel, this process can be streamlined for re-use in your organization.

Predefined MS Excel File

MS Excel Import Menu

Imported File

- **Context Sensitive Help**

    The relevant help topic for any pane / dialogue box can be invoked by either pressing the 'F1' key or by clicking 'Context Sensitive Help' icon from Toolbar. It is an extremely useful feature when using the wizard based input mode. To activate help related to the current wizard dialogue simply press 'F1'.
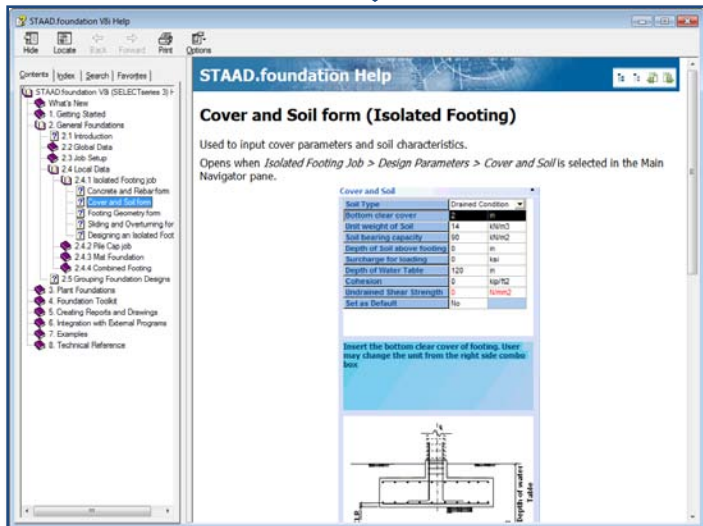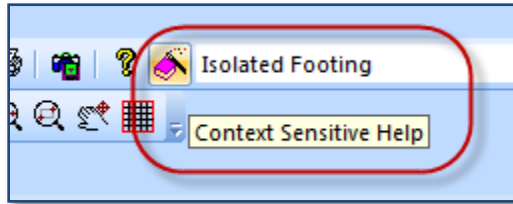
Context Sensitive Help Using Button From Toolbar

Context Sensitive Help Using 'F1' Key
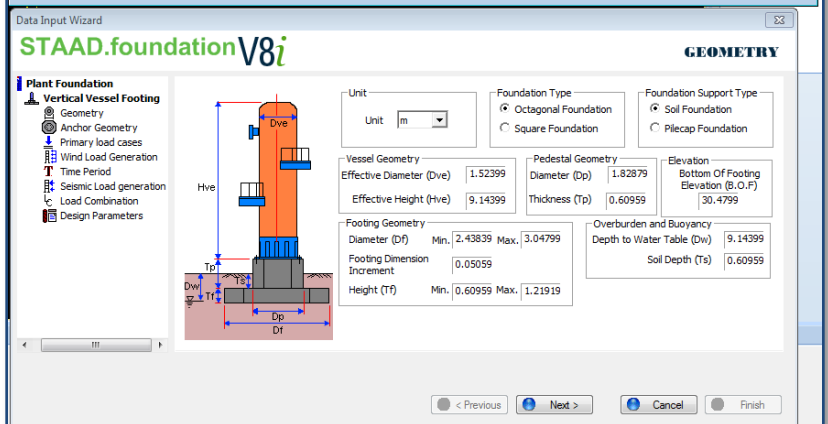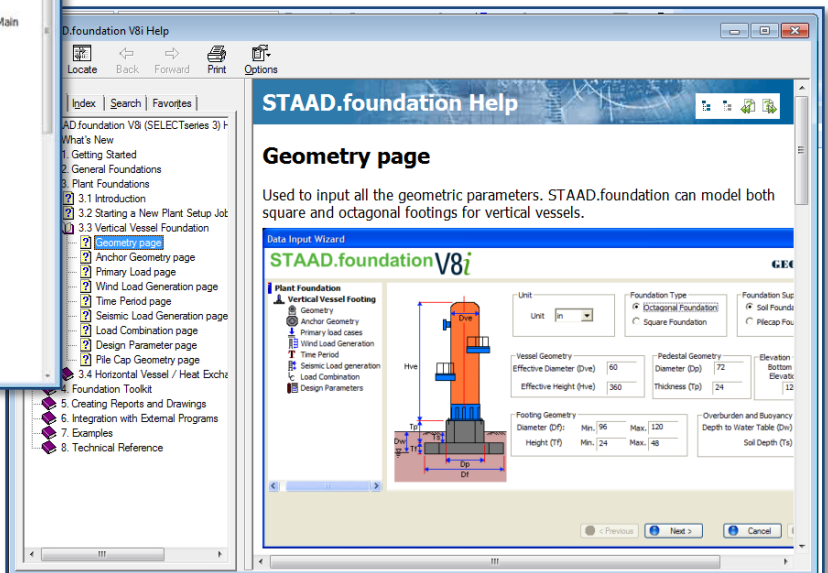
- New Load Types

    Four new types of loads - 'Wind X, Wind Z, Seismic X & Seismic Z'- have been added to the program. This feature gives you with better control over load modeling.
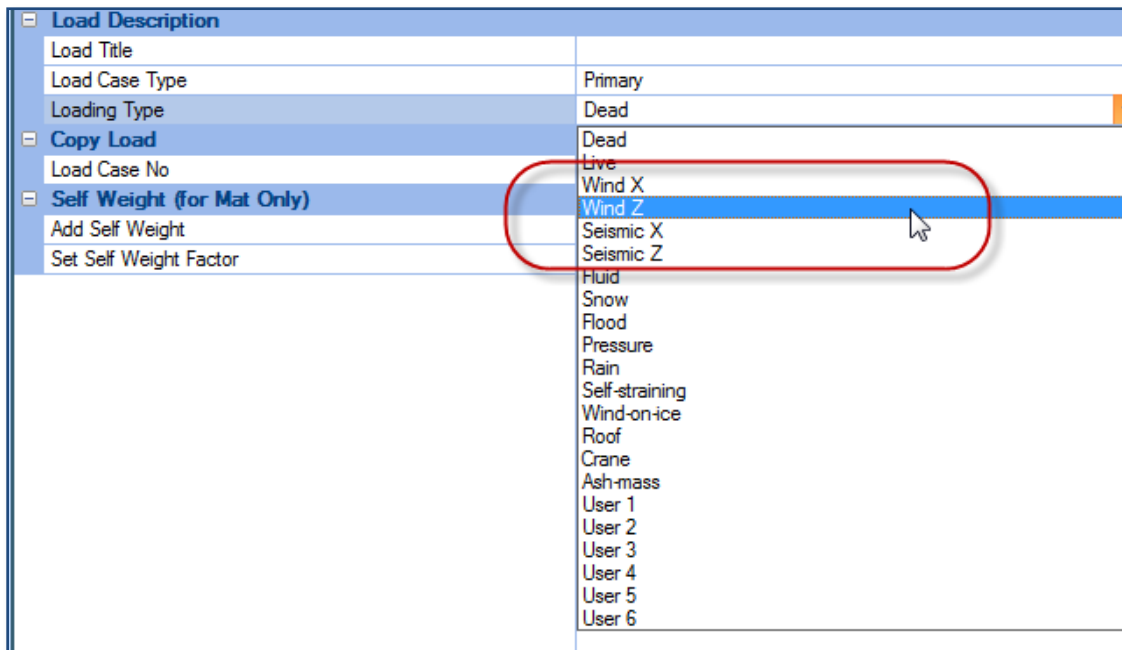
- STAAD.Pro Import From Command Prompt

    If you are programming routines and wish to automate the import of STAAD.Pro output into STAAD.foundation, you can do so through the Windows Command Line.

    The following syntax is used:

    ```
    <location of STAAD.foundation executable> <location of the
    STAAD.Pro input file>
    ```
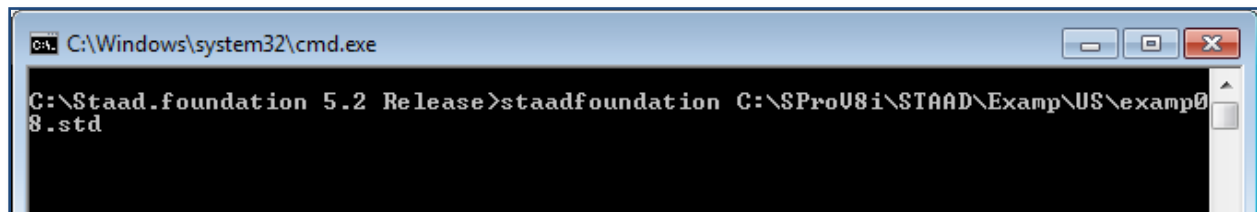
Mat Foundation

- Soil On Top Of Mat

  Soil on top of a mat foundation can now be considered in analysis. Input the density and height of the soil in the Mat Foundation Soil Properties form. The contribution of the dead weight is controlled in the Add Self Weight dialog, which has been updated to reflect the inclusion of soil as dead weight.

Soil On Top of Mat Input

Modified 'Dead Weight' Table

Calculation Sheet Reporting

- ## Mat Foundation Calculation Sheet

    The Calculation sheet created when a mat foundation is designed has been standardized to the format used throughout the program.

JOB DETAILS

JOB NAME		job1	
Included Support	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000
2	5.486	0.000	0.000
3	11.582	0.000	0.000
4	0.000	0.000	7.315
5	5.486	0.000	7.315
6	11.582	0.000	7.315

Before (V5.1)

LOAD DETAILS

INCLUDED LOADS

Load Case No	1:
Primary	Primary
Serviceability Factor	1.000
Design Factor	1.000

Reaction Load			
NODE NO.	Fx (kN)	Fy (kN)	Fz (kN)
1	18.052	-302.629	3.100
2	2.130	-1286.970	3.236
3	-20.182	-759.415	2.999
4	18.052	-302.629	-3.100

After (V5.2)

DESIGN OF MAT FOUNDATION

Job Details

Job Name : job1

Included Support	X (in)	Y (in)	Z (in)
1	0.000	0.000	0.000
2	216.000	0.000	0.000
3	456.000	0.000	0.000
4	0.000	0.000	288.000
5	216.000	0.000	288.000
6	456.000	0.000	288.000

Load Details

Included Loads

Load Case No	1:
Primary	Primary
Serviceability Factor	1.000
Design Factor	1.000

Reactions

NODE NO.	Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip-in)	My (kip-in)	Mz (kip-in)
1	4.058	-68.034	0.697	33.317	-0.009	-209.599
2	0.479	-289.322	0.727	34.795	-0.006	-53.876
3	-4.537	-170.723	0.674	32.245	0.002	189.453
4	4.058	-68.034	-0.697	-33.317	0.009	-209.599
5	0.479	-289.322	-0.727	-34.795	0.006	-53.876
6	-4.537	-170.723	-0.674	-32.245	-0.002	189.453

Pile Cap Foundation

- Canadian Pile Cap Foundation

    Pile cap design per Canadian code (CSA A23-94) - Access this feature in the General Foundation mode (Create Job form). One way shear is checked per Section 11 and punching shear per Section 13. Similar to other pile cap modules, calculation sheet, detail drawing & GA drawing is generated as an output.
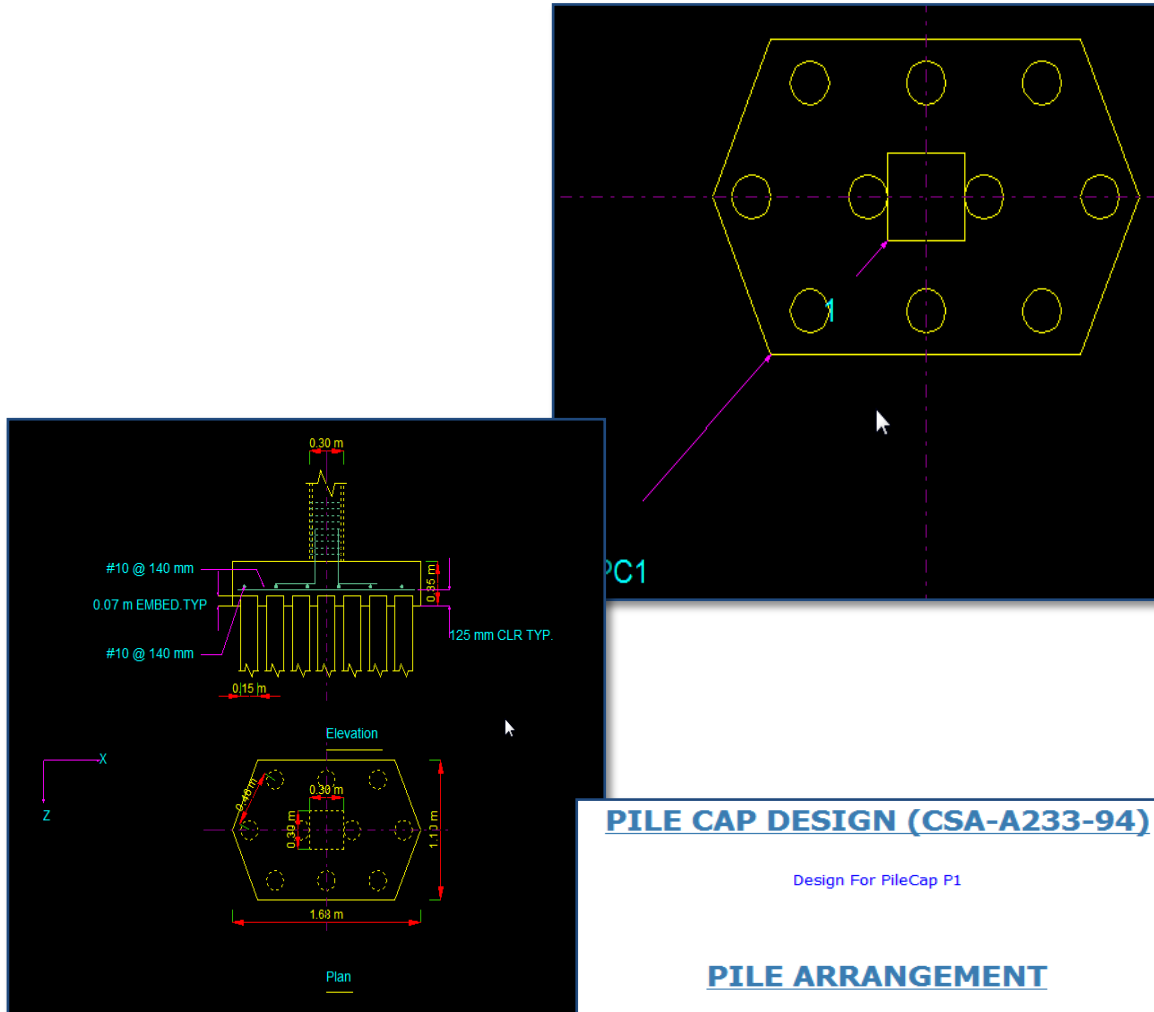
PILE CAP DESIGN (CSA-A233-94)

Design For PileCap P1

PILE ARRANGEMENT

Column Dimensions

Column Shape : Rectangular
Column Length - X (Pl) : 0.305 m
Column Width - Z (Pw) : 0.305 m

Pedestal

Include Pedestal? No
Pedestal Shape : N/A
Pedestal Height (Ph) : N/A
Pedestal Length - X (Pl) : N/A
Pedestal Width - Z (Pw) : N/A

- ## Pile Cap Foundation Calculation Sheet

    The Calculation sheets for Indian and British pile cap foundations have been standardized to the format used throughout the program.

Pile Cap Design (India)

Design For PileCap P1

Pile Cap P1

PILE ARRANGEMENT

Given Values

Pile spacing :	P_s =	1.200	m
Edge distance (from pile center to free edge of cap) :	e =	0.350	m.
Column size (in investigated direction):	h =	0.250	m
Column size (in investigated perpendicular direction) :	b =	0.250	m
Pile Diameter :	d_p =	0.400	m
Pile Capacity :	P_p =	250.000	kN

Loading applied at top of cap

Load Case	F_x (kN)	F_y (kN)	F_z (kN)	M_x (kNm)	M_y (kNm)	M_z (kNm)
101	0.000	-800.000	0.000	0.000	0.00	
102	0.000	-1200.000	0.000	0.000	0.00	

Concrete :	f'_c =	25000.004	kN/m^2
Reinforcement :	f_y =	415000.070	kN/m^2

The cap design is based on actual pile reactions

Before (V5.1)
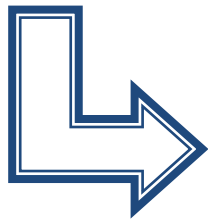
After (V5.2)

PILE CAP DESIGN

Design For PileCap P1

PILE ARRANGEMENT

Column Dimensions

Column Shape : Rectangular

Column Length - X (Pl) : 0.250 m

Column Width - Z (Pw) : 0.250 m

Pedestal

Include Pedestal? Yes

Pedestal Shape : Rectangular

Pedestal Height (Ph) : 0.500 m

Pedestal Length - X (Pl) : 0.250 m

Pedestal Width - Z (Pw) : 0.250 m

Pile Cap Geometrical Data

Pile Cap Length P_{CL} = 1.900 m

Pile Cap Width P_{CW} = 1.900 m

Initial Pile Cap Thickness t_I = 0.650 m

Isolated Foundation

- ## Indian & British Code Pedestal Design

    Pedestal design per Indian and British codes (IS-456-2000 and BS 8100-97, respectively) - Available in the General Foundation mode (Create Job form) or in the Foundation Toolkit mode (Isolated Footing or Combined Footing Job pages). Automatic bar arrangement is performed, similar to the US code pedestal design.

0.61 m

0.61 m

6 mm @ 255 mm

16mm - 8 no.s

Section A-A
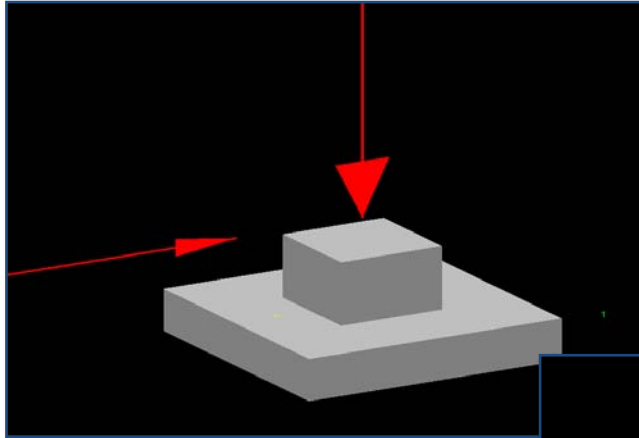
Pedestal Reinforcement Design

Critcal load Case : 102

Critcal Applied Axial Load: 3000.000 kN

Critcal Applied Moment Along X Direction: 60.959 kNm

Critcal Applied Moment Along Z Direction: 60.959 kNm

Pedestal design is performed in accordance with IS 456 Section 39

Position Of Neutral Axis Along X Direction: 0.497 m

Position Of Neutral Axis Along Z Direction: 0.497 m

Pedestal Moment Capacity Along X Direction: 322.778 kNm

Pedestal Moment Capacity Along Z Direction: 322.778 kNm

Minimum longitudinal pedestal reinforcement is calculated based on

IS-456-2000 Section 26.5.3.1 (Clause 26.5.3.1.a to Clause 26.5.3.1.h)

Required Main Reinforcemnt: 2400.000 mm2

Pedestal Main/Compression Reinforcement: 12 - Ø16

Pedestal Tie Detail: Ø6 @ 255 mm

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- Controlling Parameter To Restrict Allowable Uplift

A new parameter for Min % of Contact Area has been introduced in isolated footing for all codes.
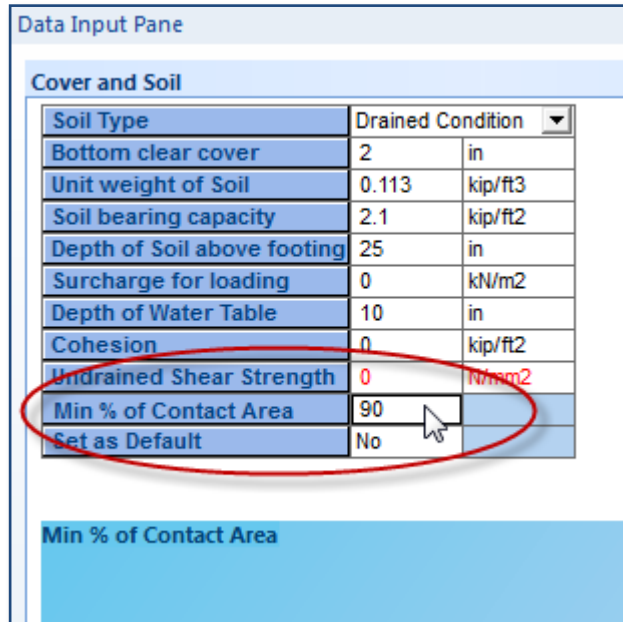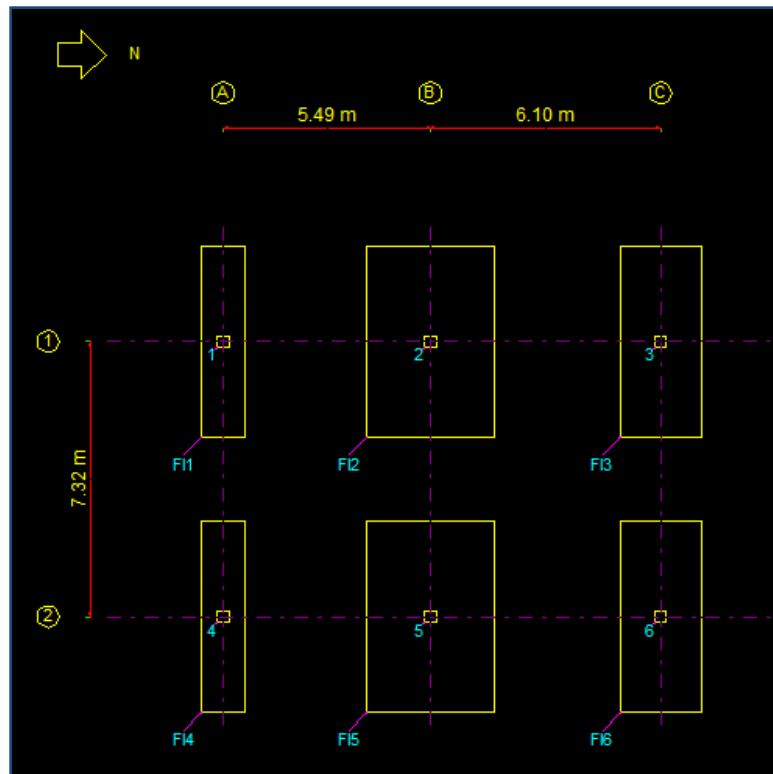
- ## Fixed Length And Fixed Width Option

In addition to specifying both plan dimensions or having the program design them, you may now specify one dimension as fixed and the program will design the other. This is a very important feature when foundation size is restricted because of site conditions.
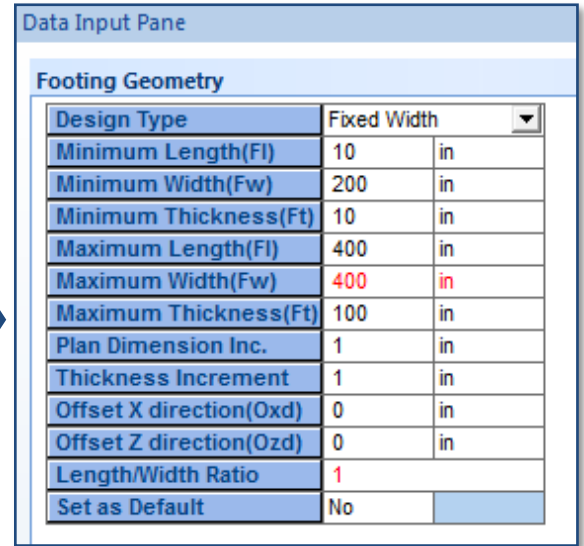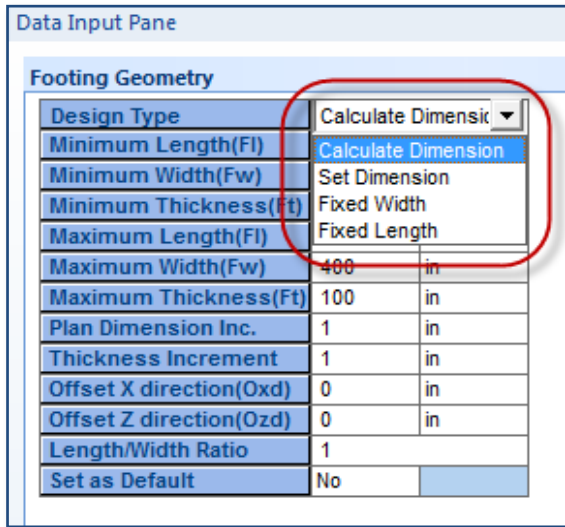
New Design Type Options

Fixed Width Option

Width Restricted Design

- ## Negative Offset For Isolated Footing

The program can take column offset dimensions in any direction. Therefore, the column can be in any quadrant. The program will check sliding and overturning for governing cases based on location of column.

Data Input Pane

Footing Geometry

Design Type	Calculate Dimensio ▼	
Minimum Length(Fl)	10	in
Minimum Width(Fw)	200	in
Minimum Thickness(Ft)	10	in
Maximum Length(Fl)	400	in
Maximum Width(Fw)	400	in
Maximum Thickness(Ft)	100	in
Plan Dimension Inc.	1	in
Thickness Increment	1	in
Offset X direction(Oxd)	-12	in
Offset Z direction(Ozd)	-24	in
Length/Width Ratio	1	
Set as Default	No	
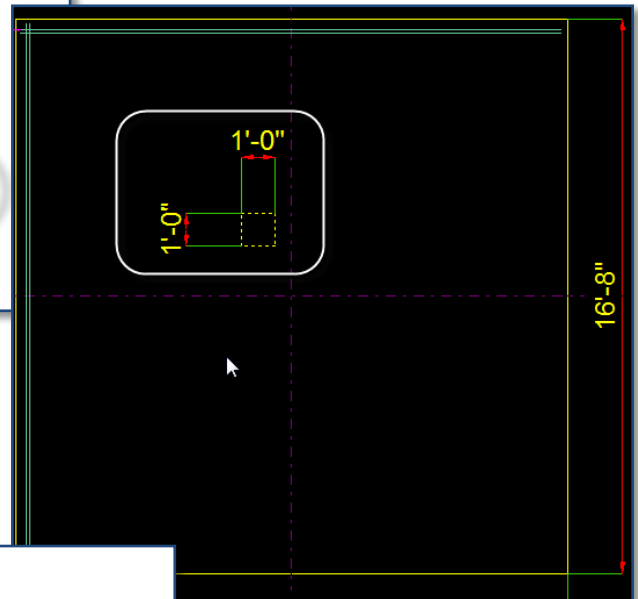
Pressures at Four Corners

Load Case	Pressure at corner 1 (q_1) (kN/m^2)	Pressure at corner 2 (q_2) (kN/m^2)	Pressure at corner 3 (q_3) (kN/m^2)	Pressure at corner 4 (q_4) (kN/m^2)	Area of footing in uplift (A_u) (m^2)
1	**30.5966**	24.8666	8.4182	14.1482	0.000
1	30.5966	**24.8666**	8.4182	14.1482	0.000
1	30.5966	24.8666	**8.4182**	14.1482	0.000
1	30.5966	24.8666	8.4182	**14.1482**	0.000

- ## Crack Control Check

    Crack control rebar spacing is now checked and reported for footing designed by the US code (ACI 318, chapter 10). Crack control check is already implemented for Indian Code.

    Selected Bar Size = #5

    Minimum spacing allowed (S_{min}) = 4.000 in

    Selected spacing (S) = 8.384 in

    $S_{min} <= S <= S_{max}$ and selected bar size < selected maximum bar size...

    The reinforcement is accepted.

    According to ACI 318-05 Clause No- 10.6.4

    Max spacing for Cracking Consideration = 10.000 in

    Safe for Cracking Aspect.

    Based on spacing reinforcement increment; provided reinforcement is

    #5 @ 8.384 in o.c.

- ## Isolated Footing Self Weight Calculation

    Self weight calculations will be performed based on final footing size. This feature will provide accurate service checks and you do not need to refine the footing thickness.

- ## Advanced Grouping Option

    Grouping isolated footings creates a separate job with dimensions of the governing footing. The calculation sheet is generated with one footing for the group.
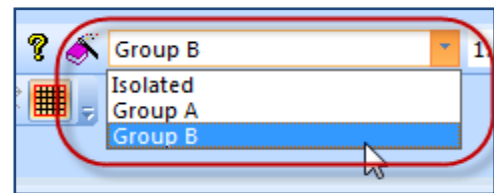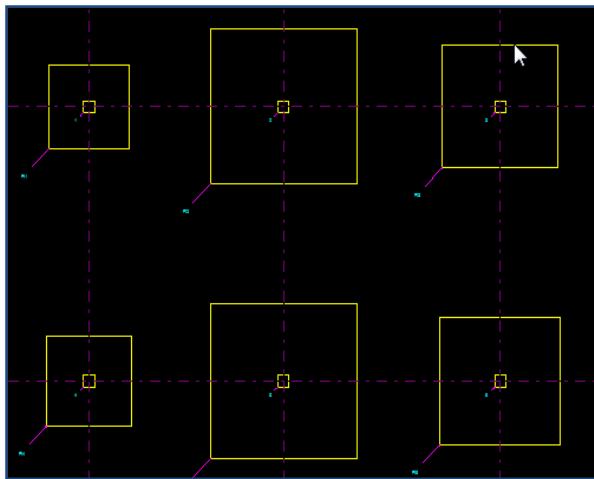
Footing No.	Group ID	Foundation Geometry		
-	-	Length	Width	Thickness
2	1	3.333 ft	3.333 ft	1.000 ft
3	2	3.333 ft	3.333 ft	1.000 ft

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
2	#3 @ 8 in c/c	#4 @ 16 in c/c	#4 @ 16 in c/c	#3 @ 8 in c/c	N/A	N/A
3	#3 @ 8 in c/c	#4 @ 16 in c/c	#4 @ 16 in c/c	#3 @ 8 in c/c	N/A	N/A

Plant Foundation

- ## Vertical Vessel Octagonal Footing Dimension Increment

  Vertical vessel octagonal footing increment can now be given as an input. With this feature, footing size will comply with common formwork increment requirements.