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# STAAD Foundation Advanced

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V8i

What's New



**DAA039810-1/0001**  
Last updated: 11 April 2012



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Thank you for your purchase of a STAAD Foundation Advanced V8i license! This new product is built upon the previous STAAD.foundation program but includes powerful new features and an improved user interface. The name change represents the extended feature set available in the program in comparison to the limited foundation design capabilities which are available with a license of STAAD.Pro V8i.

Whether you are new to STAAD Foundation or have used STAAD.foundation in the past, then we suggest you spend some time reading this document and trying some of the examples in order to familiarize yourself with the program. Even if you've used previous versions STAAD.foundation before, we feel that you'll benefit from learning the new user interface.

The following list provides describes new features for users of STAAD Foundation (the previous version of this product).

The following list provides describes new or enhanced features of STAAD Foundation Advanced V8i added since version 6.0:



# 1 ISM Export

You can now export STAAD Foundation model to Integrated Structural Modeling (ISM) for following types of general foundations

- Isolated (All codes)
- Combined (All codes)

ISM is currently supported by the following Bentley products:

- **Structural Synchronizer V8i**

**Note:** Structural Synchronizer is required to create, update, and review ISM repositories.

- **ISM Revit plug-in V8i**
- **Structural Dashboard V8i**
- **RAM Elements V8i**
- **RAM Concept V8i**
- **RAM Structural System V8i**
- **Structural Modeler V8i**
- **ProStructures V8i**

Now, STAAD Foundation Advanced V8i can export footing information to products listed above. For more help on ISM please follow the link below

<http://www.bentley.com/en-US/Products/Structural+Analysis+and+Design/ISM>

## 1.1 To create or update an ISM Repository

1. Click the STAAD Foundation Application button and select **Sync ISM** from the application menu.
2. Select either:

Select this...	to...
Update Repository	update an existing ISM repository with data from your STAAD Foundation project.
Create Repository	create a new ISM repository from your STAAD Foundation project.

## 2 Anchor Bolt Library

You can create anchor bolt arrangements for footings in STAAD Foundation Advanced V8iRelease 6.1. For this release, the anchor bolt information is used for isolated footing drawing generation for all codes.

In the Main Navigator pane, select **Foundation Plan > Anchor Bolt Library**. The Anchor Bolt Library form opens in the task pane.



**Anchor Bolt Library**

Add Library      Select Existing Library

Anchor Bolt Library Name: My Library

Anchor Bolt Library Details

Layout Name: 2x2

Length Unit: in

Anchor Bolt Details

Diameter: 0.75      Embedment Length: 6

Projection Length: 2      Edge Distance: 2.5

Baseplate Dimensions

Length: 18      Width: 18      Thickness: 1

Clearance From Pedestal Edge: 2

Callout Expression: Standard

Geometry Generation

Rectangular       Circular

Number Of Rows: 2

Row Spacing: 8

Number Of Columns: 2

Column Spacing: 8

Generate Coordinates

	X ft	Z ft
1	0.000	0.000
2	0.667	0.000
3	0.000	0.667
4	0.667	0.667
5		

Save / Update Layout

Add Layout      Delete Layout

Once a library is created, it is saved in the installation folder .../STAAD Foundation Advanced/AnchorBoltLibrary with the file extension .abl. These library files can be reused and distributed among other STAAD Foundation users. The program also backups library files each time a library saved or updated. Backup library files are located under .../STAAD Foundation Advanced/AnchorBoltLibrar/BackupAnchorBoltLibrary/

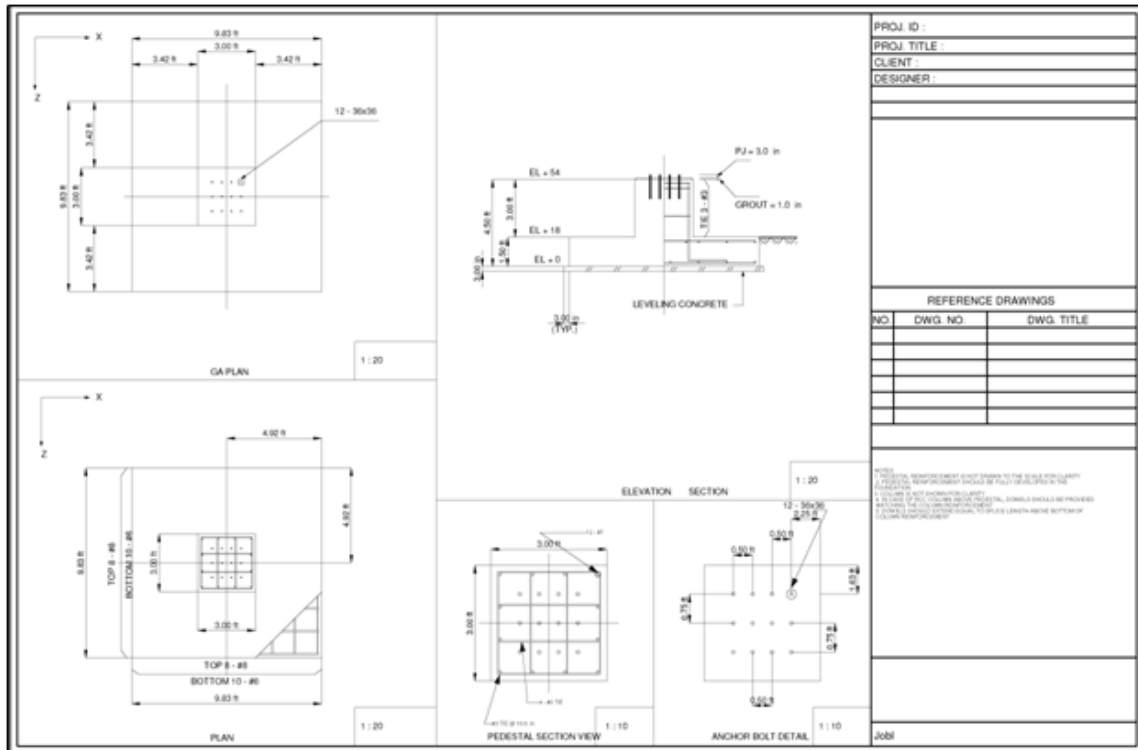
You can auto-generate rectangular and circular anchor bolt arrangements. Odd shape arrangements can be achieved by manual coordinate input in coordinate table.

	X m	Z m
1	0.000	0.000
2	0.152	0.000
3	0.305	0.000
4	0.457	0.000
5	0.000	0.102
6	0.152	0.102
7	0.305	0.102
8	0.457	0.102

Once you have added one or more anchor bolt libraries containing some anchor bolt layouts, these can be used at a support by selecting them in the Pedestal and Anchor Bolt Table.

## 3 Isolated Footing Enhanced Drawing

The detail drawing for isolated footing has been greatly improved. The enhanced drawing is now construction-ready:



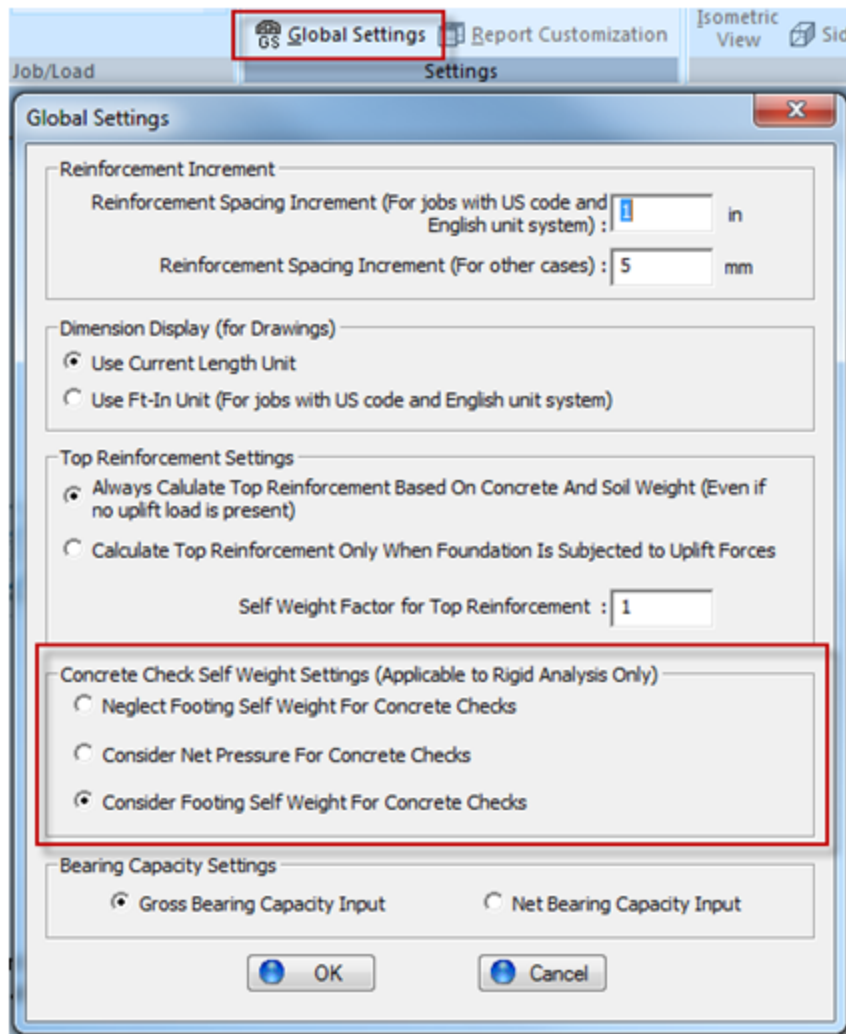
It consists of following key features

- Auto-scaled views
- True scale reinforcement along with thickness for congestion detection
- Anchor bolt overlay on pedestal reinforcement
- Concrete grout, leveling concrete, Project Elevation options
- Revised Title Block

This feature has been implemented for isolated footing for all codes.

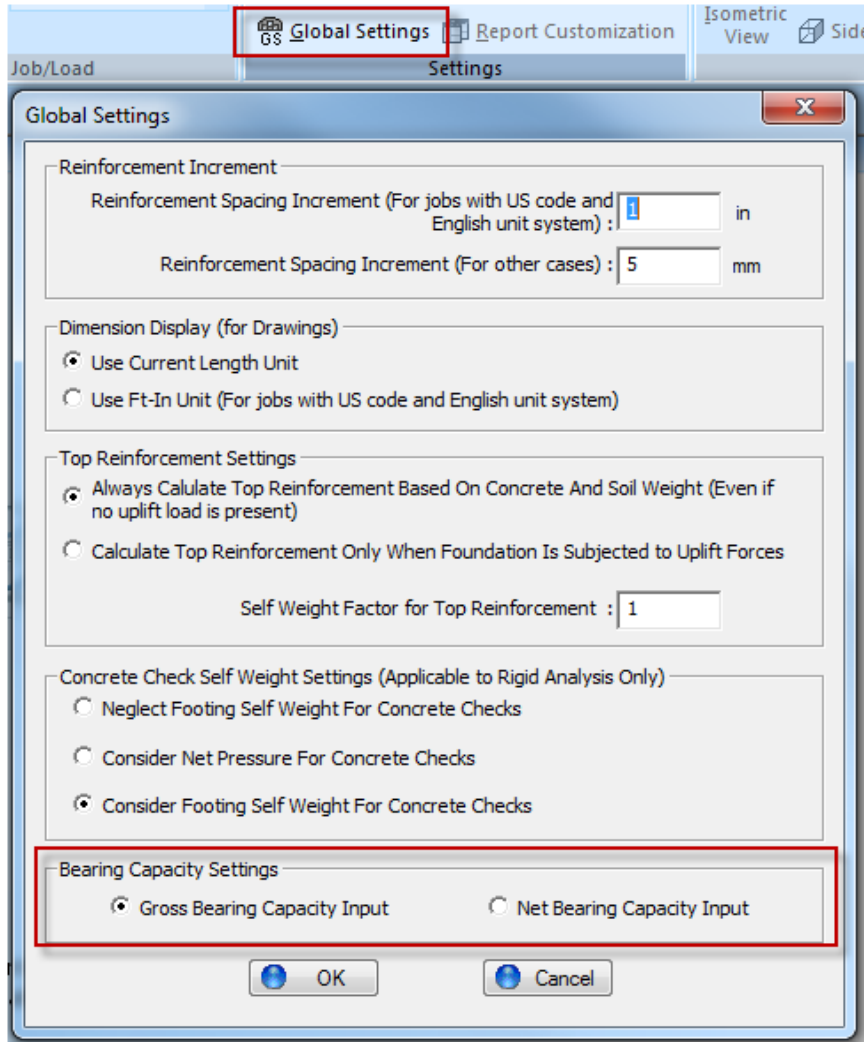
## 4 Concrete Check Options

You can choose net pressure option for ultimate checks. From Ribbon Interface, Home-> Settings, select Global Settings. From 'Concrete Check Self Weight Settings', you can choose concrete check options, please note that these options are applicable for isolated footings (all codes) only.



## 5 Bearing Capacity Type

You can choose input type for Soil bearing pressure using a new option found on the Global Settings dialog.



Bearing capacity option is available for Isolated and Combined footing module in General Mode for all codes.

## 6 Compression Development Length for Isolated Footing

The program can now check the depth of isolated footing against compressive development length of column reinforcement.

Select **Foundation Plan > Column Dimensions** in the Main Navigator window. The Column Dimension table opens in the Task Pane. Two new table columns are added for this check: **Colm Reinf Dia** and **Colm Utility Factor**.

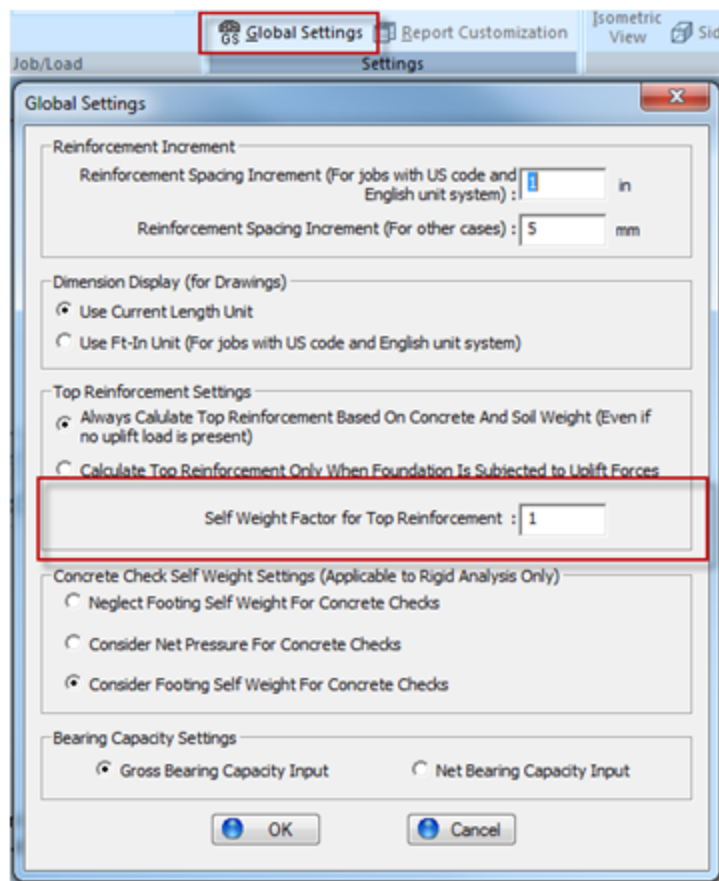
Column Dimension					
Support No.	Shape	Column Length/Dia ft	Column Width ft	Colm Reinf Dia in	Colm Utility Factor
1	<input checked="" type="radio"/> Rectangular <input type="radio"/> Circular	1.0000	1.0000	0.5	0.7
2	<input checked="" type="radio"/> Rectangular <input type="radio"/> Circular	1.0000	1.0000	0.5	0.8
3	<input checked="" type="radio"/> Rectangular <input type="radio"/> Circular	1.0000	1.0000	0.5	0.75
4	<input checked="" type="radio"/> Rectangular <input type="radio"/> Circular	1.0000	1.0000	0.5	0.9
5	<input checked="" type="radio"/> Rectangular <input type="radio"/> Circular	1.0000	1.0000	0.5	0.7

This feature is available for isolated footing module in general mode for US and IS code

## 7 Top Reinforcement Load Factors

You can control percent of self weight and soil weight considered for pseudo moment used in the design of top reinforcement.

When the **Always Calculate Top Reinforcement Based On Concrete And Soil Weight** option is selected on the *Global Settings* dialog, the top reinforcement design is performed with an assumed pseudo hogging moment which is based upon the weight of the footing and soil when uplift forces are not present.



This enhancement is applicable for

- Isolated footing module in general mode for all codes
- Strap footing module in general mode for US code
- Vertical vessel on square footing in plant mode for all codes
- Horizontal vessel isolated footing in plant mode for all codes
- Horizontal vessel strap footing in plant mode for all codes

## 8 Negative Load Combination Factors

Load combination generation table is enhanced to take negative load factors. Load combination default tables for all codes are modified. Requirements for seismic and wind load generation are met with this enhancement.

Index		Dead Load	Live Load	Wind Load X	Wind Load Z	Seismic Load	Seismic Load	Fluid	Snow	Flood	Press
6	<input checked="" type="checkbox"/>	1.000	0.750	0.000	0.000	0.000	0.000	1.000	0.000	0.000	1.000
7	<input checked="" type="checkbox"/>	1.000	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000	1.000
8	<input checked="" type="checkbox"/>	1.000	0.000	-1.000	0.000	0.000	0.000	1.000	0.000	0.000	1.000
9	<input checked="" type="checkbox"/>	1.000	0.000	0.000	1.000	0.000	0.000	1.000	0.000	0.000	1.000
10	<input checked="" type="checkbox"/>	1.000	0.000	0.000	-1.000	0.000	0.000	1.000	0.000	0.000	1.000
11	<input checked="" type="checkbox"/>	1.000	0.000	0.000	0.000	0.700	0.000	1.000	0.000	0.000	1.000



## 9 Soil Bearing and Self Weight Factors for Plant Mode

You can enter soil bearing factors and self weight modification factors in plant mode.

Soil bearing increased capacity for seismic and wind loads can be addressed through this feature. Also, the percent of self weight included in concrete checks can be controlled through the self weight modification factor.

Load Combination Table ASCE 7-05

Service Load Combination : Update Table Delete

Index		SWF	SBF	Empty	Operating	Wind	Seismic	Test	Erection	Live	U Lc
1	<input checked="" type="checkbox"/>	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	<input checked="" type="checkbox"/>	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
3	<input checked="" type="checkbox"/>	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00

Ultimate Load Combination : Update Table Delete

Index		SWF	SBF	Empty	Operating	Wind	Seismic	Test	Erection	Live	U Lc
1	<input checked="" type="checkbox"/>	1.00	1.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	<input checked="" type="checkbox"/>	1.00	1.00	0.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00
3	<input checked="" type="checkbox"/>	1.00	1.00	1.20	0.00	0.00	0.00	0.00	0.00	1.60	0.00

Note: SWF - Self Weight and Dead Weight Factor  
SBF - Soil Bearing Factor

This feature is available for

- Vertical Vessel Foundation - all modes
- Horizontal Vessel Foundation - all modes
- Tank Annular Ringwall Foundation - all modes

# 10 Sliding Check for Octagonal Footings

You can check for sliding for octagonal mode in general and plant mode for all codes.

### [Sliding Check](#)

Load Case No.	Disturbing Force (kip)	Restoring Force (kip)	Sliding Ratio
Load Case 101	3.000	55.385	18.462

Stability Ratio > 1.500 ,Hence O.K.

# 10 Node to Node Dimensions

You can add Node to node dimensions in the *Geometry* view. From Ribbon Interface, Tools-> Dimension, select 'Add Dimension Lines'. You can add dimension lines between column nodes as well as meshed nodes for mat foundation.

- Support to support dimension — This new feature can be used to get the dimension between two supports.
- Meshed node dimension — For Mat Foundation, two new tools are available in the Dimension group of the Tools ribbon tab which can be used to calculate the dimension between the meshed nodes.

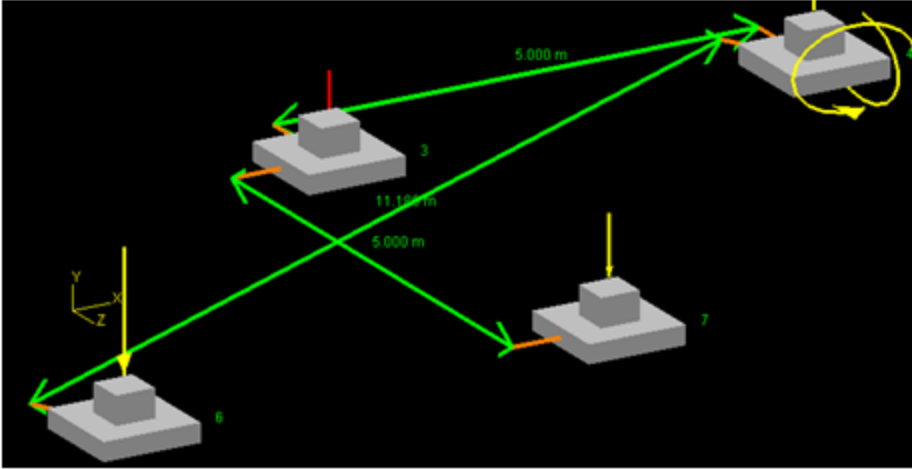
## 10.1 Adding a dimension line between supports

To add a dimension line between a pair of supports, use the following steps.

1. Select the **Add dimension line** tool on the **Tools** ribbon tab Dimensioning group.



2. Select two supports in the *Geometry* view.



The dimension line is added.

## 10.2 Deleting a dimension line between supports

To remove an existing dimension line from between a pair of supports, use the following steps.

1. Select the **Delete Dimension** tool on the **Tools** ribbon tab Dimensioning group.



2. Select two supports in the *Geometry* view.  
The dimension line is removed.

### 10.3 Adding a dimension line between meshed nodes

To add a dimension line between a pair of nodes on a mesh, use the following steps.

1. Select the **Add meshed node dimension** tool on the **Tools** ribbon tab Dimensioning group.



2. Select two supports in the *Geometry* view.  
The dimension line is added.

### 10.4 Deleting a dimension line meshed nodes

To remove an existing dimension line from between a pair of supports, use the following steps.

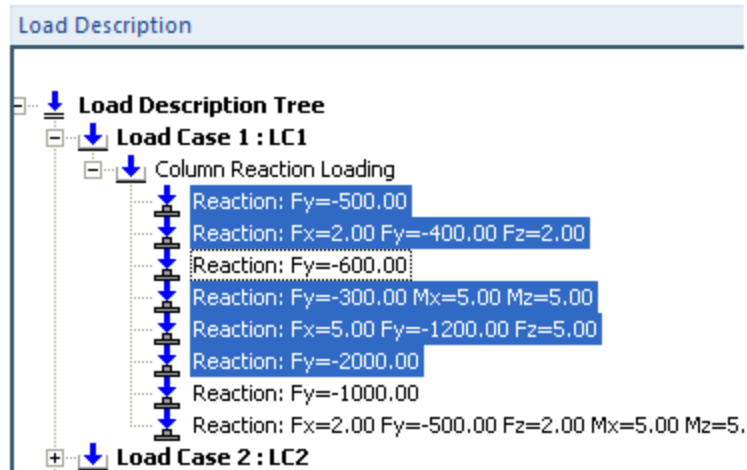
1. Select the **Delete Meshed Node Dimension** tool on the **Tools** ribbon tab Dimensioning group.



2. Select two supports in the *Geometry* view.  
The dimension line is removed.

## 11 Multiple Load Case Selection

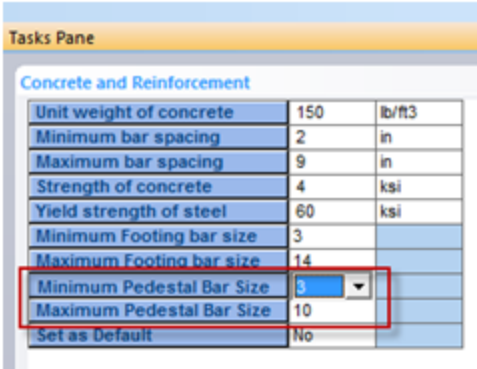
You can select multiple load cases from 'Load Description' tree by pressing Shift and/or Ctrl key. The de-selection of a particular selected load case can be done by pressing control key and clicking the appropriate load case.



## 12 Pedestal Reinforcement Input

You can enter minimum and maximum pedestal reinforcement size in the isolated foundation Concrete & Reinforcement design parameters.

In the Main Navigator pane, select **Design Parameters > Concrete & Reinforcement**. The Concrete and Reinforcement form opens in the task pane.



Concrete and Reinforcement		
Unit weight of concrete	150	lb/ft <sup>3</sup>
Minimum bar spacing	2	in
Maximum bar spacing	9	in
Strength of concrete	4	ksi
Yield strength of steel	60	ksi
Minimum Footing bar size	3	
Maximum Footing bar size	14	
Minimum Pedestal Bar Size	5	
Maximum Pedestal Bar Size	10	
Set as Default	No	

Pedestal Sizes listed correspond to the appropriate bar sizes used in the selected Design Code.

## 13 Updates to Detailed Output Spreadsheet

Corner pressure values used for ultimate load cases are now included in the detailed output spreadsheet. Footing design shear and moments are generated based on soil pressures from ultimate load cases. With these results available manual, it is now easier to perform calculations to verify moment and shear.

Concrete Check Pressure With Self Weight (Axial force reported is inclusive of self weight)								
Load Case	Ultimate Factor	P	Mx	Mz	SB1	SB2	SB3	SB4
2	1	1683.75	0	0	137.449	137.449	137.449	137.449

One Way Shear Stress							
Load Case	Ultimate	Applied Shear		Shear Capacity		Unity Check	
		Vxu	Vzu	Vxc	Vzc	Vx	Vz
2	1	242.99	242.99	284.359	284.359	1.17	1.17

The concrete check pressure table is included in the detailed output spreadsheet for Indian Code for Isolated Footing.

# 14 Shear Design for Pedestals

Pedestal shear design according to ACI 318 05 is implemented for isolated module US code.

## Pedestal Design Calculations

**Critical Load Case:** 103

### Calculation Of Shear Capacity

#### **Design Passed in Shear**

Shear along X : 0.000 kip

Shear along Z : 0.000 kip

( $\phi = 0.75$ , ref ACI 318 Clause No 9.3.2.3)

$$\begin{aligned} \text{Shear Capacity (for FX) from Concrete, } \phi V_c X &= \phi 2 \left[ 1 + \frac{N_u}{2000 \Lambda_g} \right] \sqrt{f'_c} b_w d : 46.353 \text{ kip} \\ (\phi V_c X \text{ ref eqn ACI 318 05- Eqn 11.4 and Clause no } & \\ 11.3.1.2) & \end{aligned}$$

$$\begin{aligned} \text{Shear Capacity (for FX) from Ties, } \phi V_s X &= \phi A_v f_{yt} \frac{d}{s} : 17.382 \text{ kip} \\ (\phi V_s X \text{ ref eqn ACI 318 05- Eqn 11.15 and Clause No } & \\ 11.5.7.2) & \end{aligned}$$

$$\begin{aligned} \text{Shear Capacity (for FZ) from Concrete, } \phi V_c Z &= \phi 2 \left[ 1 + \frac{N_u}{2000 \Lambda_g} \right] \sqrt{f'_c} b_w d : 46.353 \text{ kip} \\ (\phi V_c Z \text{ ref eqn ACI 318 05- Eqn 11.4 Clause no } & \\ 11.3.1.2) & \end{aligned}$$

$$\begin{aligned} \text{Shear Capacity (for FZ) from Ties, } \phi V_s Z &= \phi A_v f_{yt} \frac{d}{s} : 17.382 \text{ kip} \\ (\phi V_s Z \text{ ref eqn ACI 318 05- Eqn 11.15 and Clause No } & \\ 11.5.7.2) & \end{aligned}$$

Tie bar used : 3

Legs for resisting FX : 2

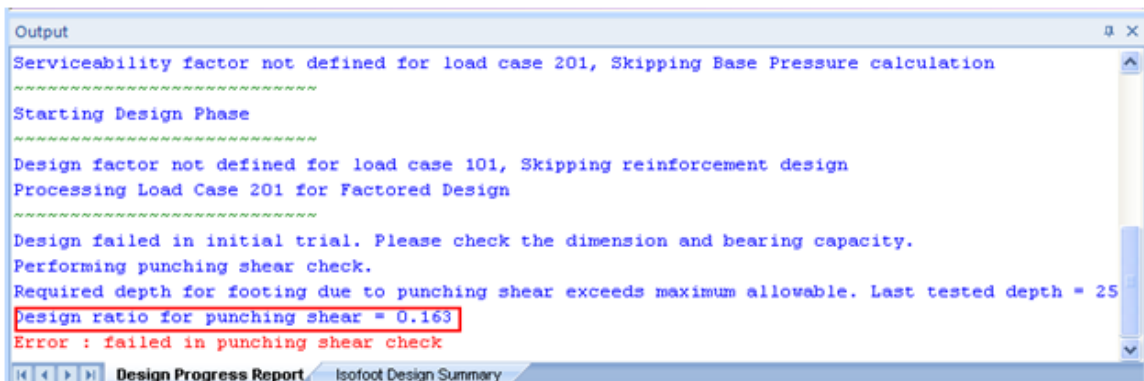
Legs for resisting FZ : 2

(Spacing Calculation ref Clause no 11.5.5.1 and 11.5.6.3 and Eqn 11.13)



## 15 Isolated Footing Error Reporting

Upon design failure, you can see unity ratio by which the design failed. These enhanced failure messages will help in determining next probable footing size effectively.



```
Output
Servicesability factor not defined for load case 201, Skipping Base Pressure calculation
*****
Starting Design Phase
*****
Design factor not defined for load case 101, Skipping reinforcement design
Processing Load Case 201 for Factored Design
*****
Design failed in initial trial. Please check the dimension and bearing capacity.
Performing punching shear check.
Required depth for footing due to punching shear exceeds maximum allowable. Last tested depth = 25
Design ratio for punching shear = 0.163
Error : failed in punching shear check
```

## 16 Update to Import/Export

The following new fields were added in the Microsoft® Excel® spreadsheet import and export implementation.

- Addition of a new Tab Grid Table, reporting the Grid Data in a table format.
- Addition of pedestal minimum and maximum bar size.
- Addition of reinforcement diameter, utility factor, and anchor bolt layout under Support Data Tab.



Bentley Systems, Incorporated  
685 Stockton Drive, Exton, PA 19341 USA  
+1 (800) 236-8539  
[www.bentley.com](http://www.bentley.com)