

EZ-Pile Irregular

INSTALLATION

Download the installation folder and run the EXE file, which will install the program in your PC

To uninstall use windows program uninstaller via control panel

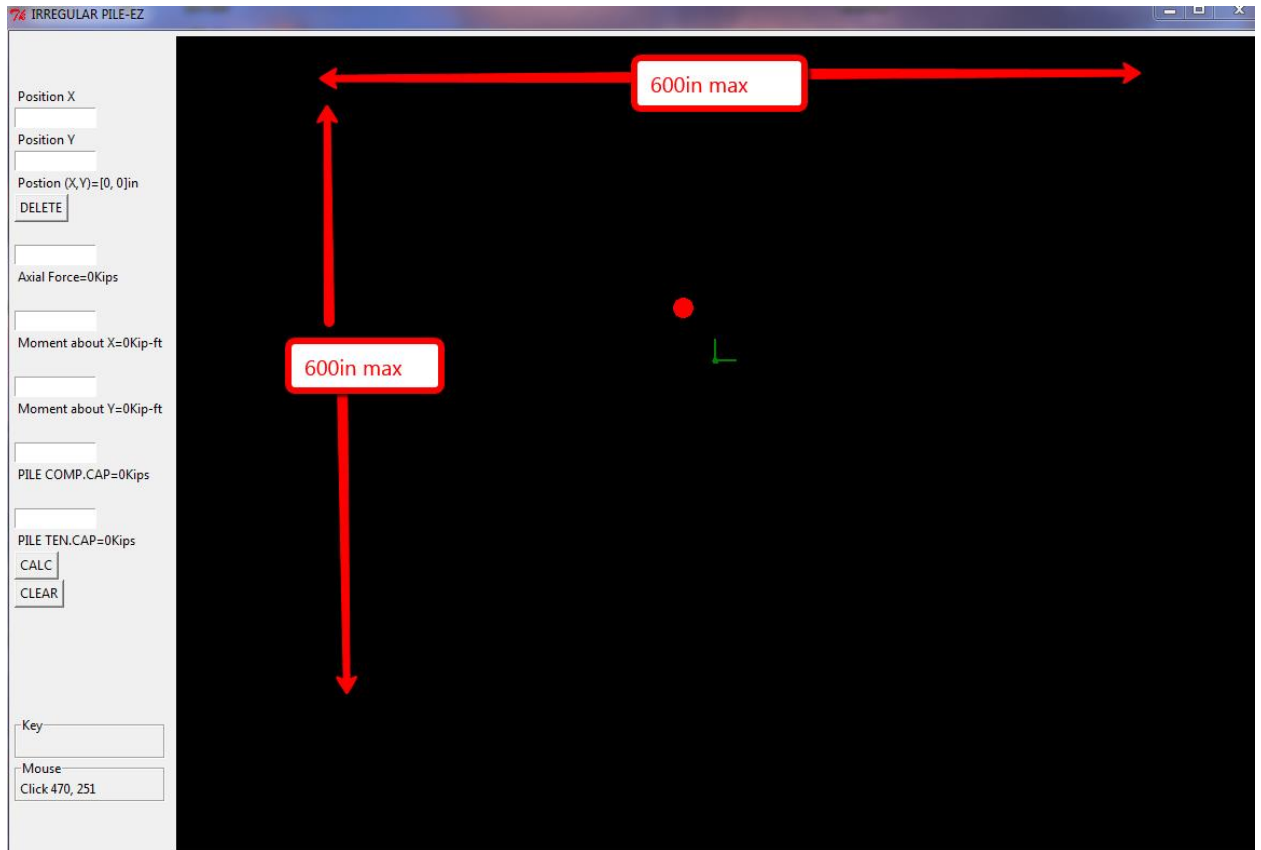
DISCLAIMER

THE USER ACCEPTS AND UNDERSTANDS THAT NO WARRANTY IS EXPRESSED OR IMPLIED BY THE DEVELOPERS OR THE DISTRIBUTORS ON THE ACCURACY OR THE RELIABILITY OF THIS PRODUCT. THE USER MUST EXPLICITLY UNDERSTAND THE BASIC ASSUMPTIONS MADE, AND SHOULD COMPENSATE FOR THE ASPECTS THAT ARE NOT ADDRESSED.

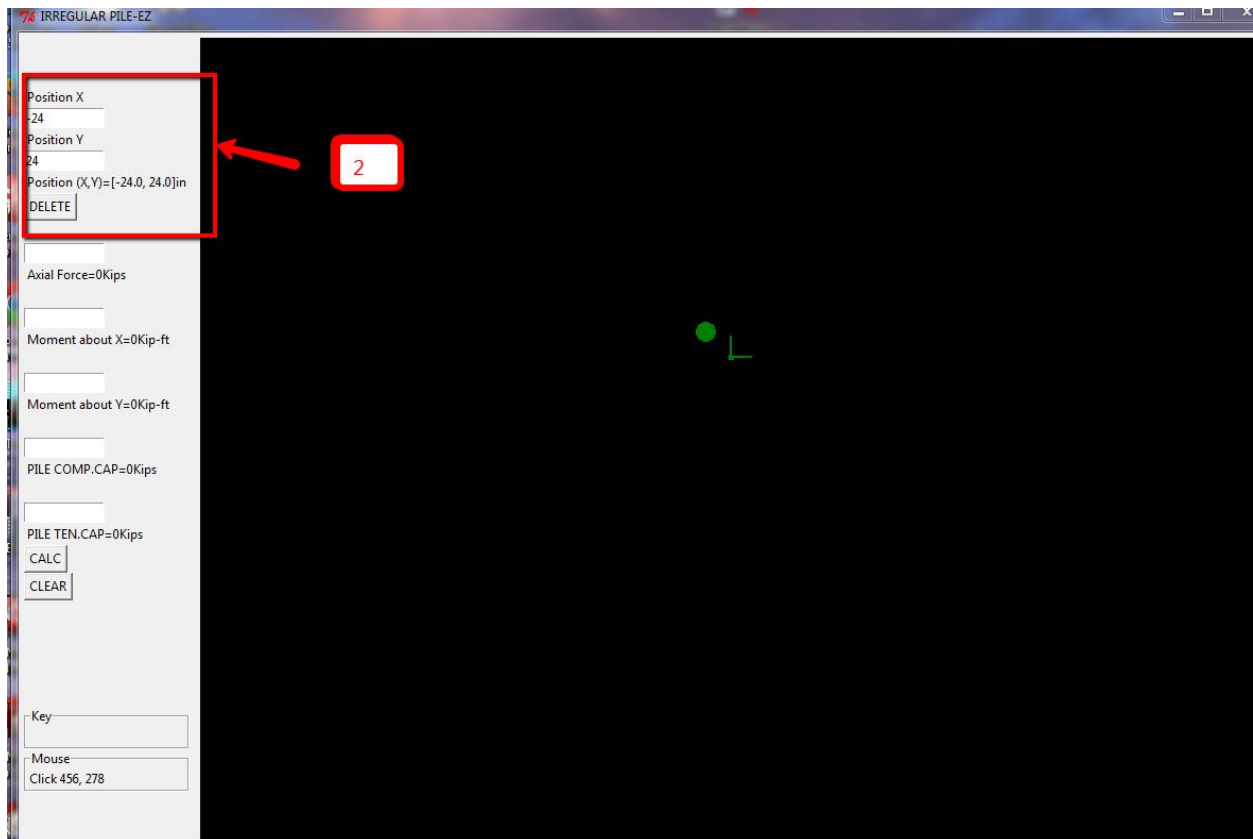
Program Graphic User Interface (GUI) and use

Algorithm Notes:

- The program can be used interactively to design pile groups
 - The program assumes rigid pile cap theory to distribute loads
 - All piles are assumed rigid and on rigid supports
- 1) Click on any location on the screen to create a pile, maximum pile cap size can be about 600in by 600in, this is simply a practical limit. Pile caps that are too large will not behave rigidly as assumed by the program



- 2) After the pile is drawn on the screen in red color, user can select the pile by clicking on it, and color will change to green at this moment the pile is in editing mode, current location coordinates of pile are indicated next to **Positions(X,Y)=**. Position is in reference to Cartesian coordinate system represented by green lines, located at origin (zero, zero). Position of the piles in Inches is indicates as (X,Y), user can easily change the coordinates by entering the desired location on input box and pressing **ENTER**, pile will move to new location and Position text will be updated. The selected pile can also be deleted by hitting the DELETE button



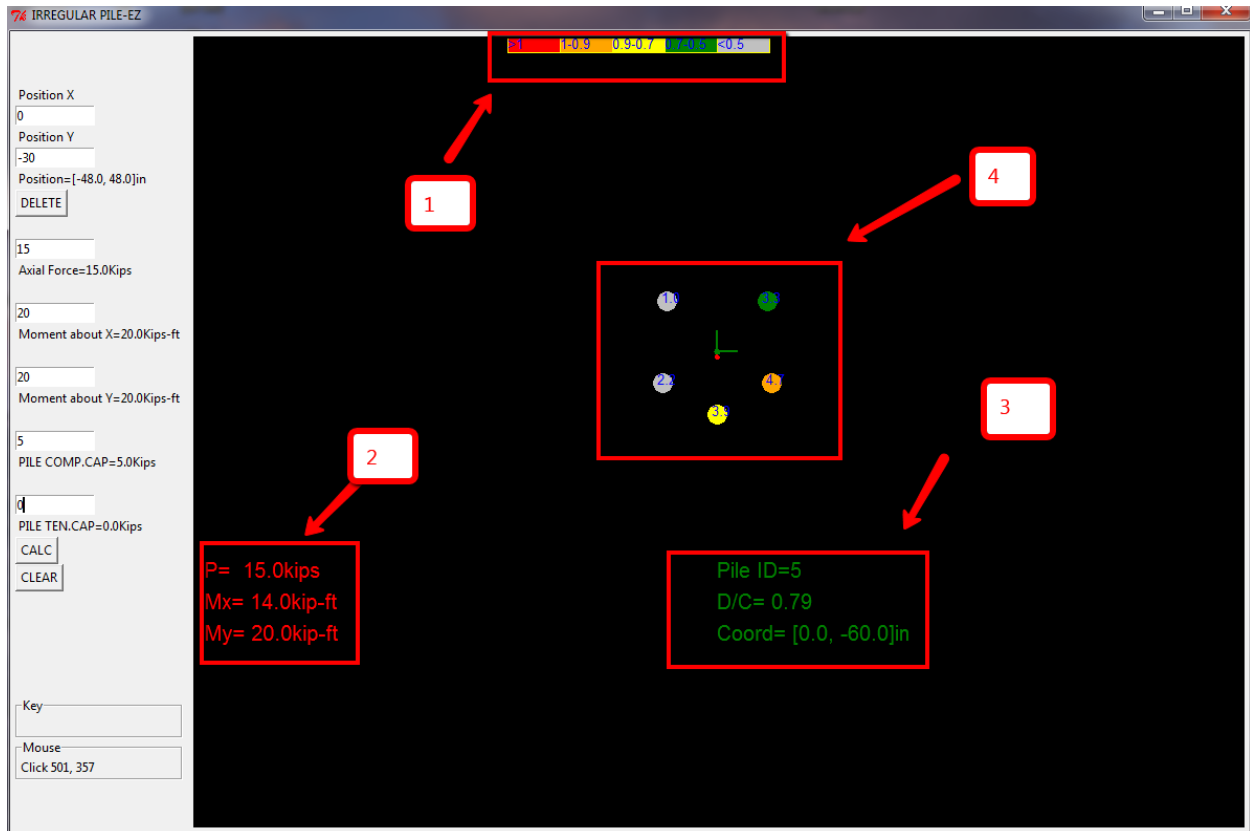
3) Continue adding and editing to exact location of piles until all piles on group have been added



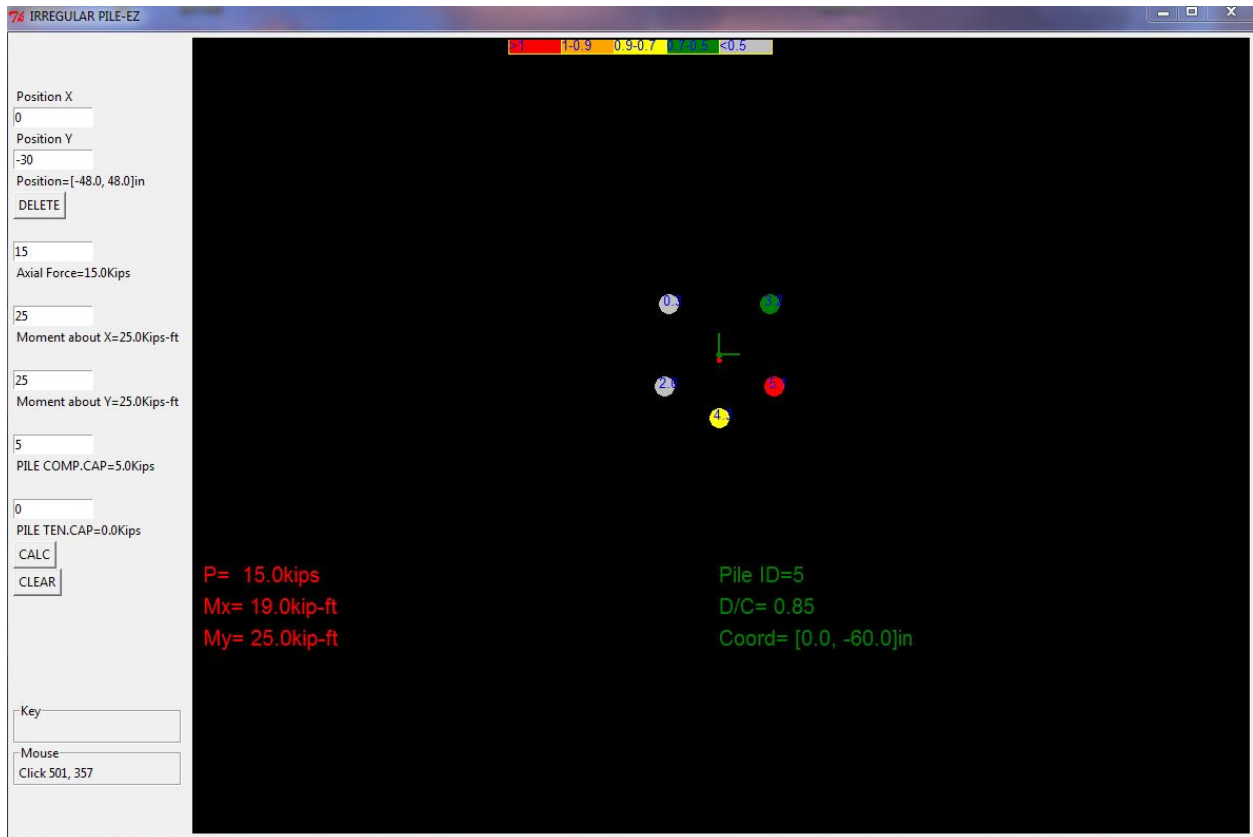
- 4) Enter Axial Applied forces on pile cap, force convention is as follows:
- Axial compression (+)
 - Axial tension (-)
 - Moments follow right hand side rule X-axis is horizontal and positive is east and Y -axis is vertical and positive is North
 - All forces are applied at centroid origin, of coordinate system in green
 - Make sure to hit ENTER after each variable is entered, which will also update labels below

The image shows a software interface for calculating pile capacity. It features several input fields and buttons. The first input field contains the number '15', and the text below it reads 'Axial Force=15.0Kips'. A red arrow points from a red-bordered box containing the text '15 and ENTER' to this input field. The second input field contains '20', with the text 'Moment about X=20.0Kips-ft' below it. A red arrow points from a second red-bordered box containing the text 'Value should read 15 after ENTER' to this input field. Below these are two more input fields, both containing '20', with labels 'Moment about Y=20.0Kips-ft' and 'PILE COMP.CAP=0Kips' respectively. At the bottom, there are two buttons labeled 'CALC' and 'CLEAR'.

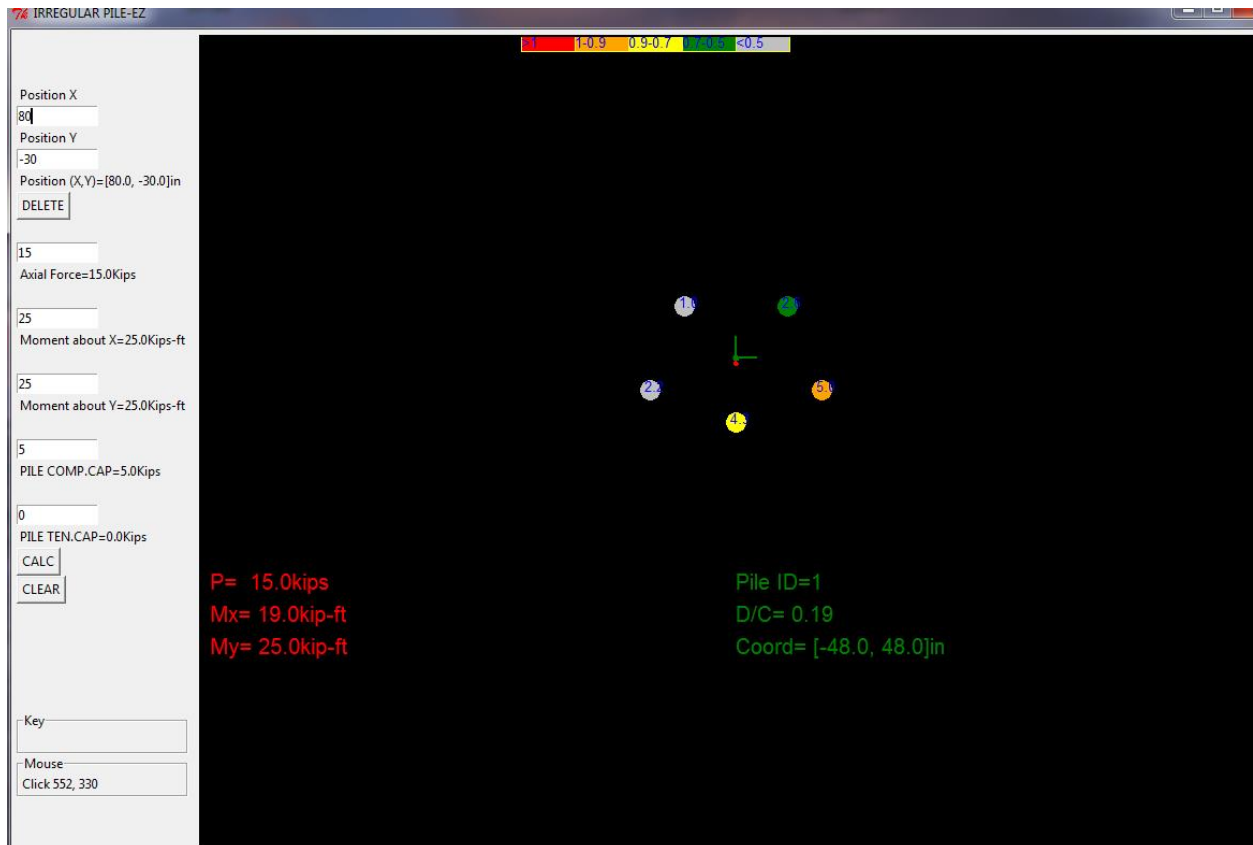
- 5) Enter compression and tension capacity of individual piles
- 6) Once all input data has been entered press CALC button, to get results on display:



- 1 D/C -Design/Capacity ratio contour
- 2 Equivalent forces at systems origin, centroid of group
- 3 User can click on piles to review detailed information about the pile
- 4 Pile group, number inside each pile represents amount of force (compression/tension on the pile), color matches D/C ratio



In order to change location of piles or to delete a pile, model needs to be unlocked first by pressing the **CLEAR** button, once this is done any variable including loads can also be changed, to get new results after editing simply **CALC** again.



A screen shot of the final design can be copied via screen shot capture and pasted in reports, there is not an option to save currently but recreating any configuration takes a few seconds

VERIFICATION EXAMPLE

The example below can be found on the NCEES practice problems for the SE exam

Vertical Forces

$$\begin{aligned}
 135. \quad I_{xx} \text{ pile group} &= 4(4.5)^2 = 81 \text{ pile-ft}^2 \\
 I_{yy} \text{ pile group} &= 6(2.25)^2 = 30.375 \text{ pile-ft}^2 \\
 \text{Footing weight} &= (7.5 \text{ ft})(12.0 \text{ ft})(3.0 \text{ ft})(150 \text{ pcf}) = 40.5 \text{ kips} \\
 \text{Maximum pile reaction} &= \frac{250 \text{ kips} + 40.5 \text{ kips}}{6 \text{ piles}} + \frac{(320 \text{ ft-kips})(4.5 \text{ ft})}{81 \text{ pile-ft}^2} + \frac{(225 \text{ ft-kips})(2.25 \text{ ft})}{30.375 \text{ pile-ft}^2} \\
 &= 48.42 + 17.78 + 16.67 \\
 &= 82.87 \text{ kips}
 \end{aligned}$$

Note: Axial force in input below includes self-weight of footing

The screenshot shows the IRREGULAR PILE-EZ software interface. On the left, there is a control panel with the following inputs and buttons:

- Position X: 54
- Position Y: 27
- Position (X,Y)=[54.0, 27.0]in
- DELETE button
- 290.5
- Axial Force=290.5Kips
- 225
- Moment about X=225.0Kips-ft
- 320
- Moment about Y=320.0Kips-ft
- 100
- PILE COMP.CAP=100.0Kips
- PILE TEN.CAP=0.0Kips
- CALC button
- CLEAR button
- Key: []
- Mouse: Click 554, 330

The main display area shows a pile group layout with six piles. A red arrow points to the pile with ID=6, which is highlighted in yellow. A red box highlights the following data for this pile:

- Pile ID=6
- D/C= 0.83
- Coord= [54.0, -27.0]in

At the bottom left of the main display, the following values are shown in red text:

- P= 290.5kips
- Mx= 225.0kip-ft
- My= 320.0kip-ft

