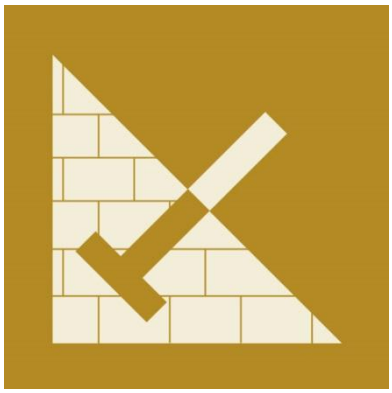

ANCHOR PRO

Version 2.2.1

User Manual

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DISCLAIMER

Every attempt has been made to ensure correctness in implementing code provisions as well as the accuracy of the calculations in Anchor Pro. In using the program, however, the user accepts and understands that no warranty is expressed or implied by S. K. Ghosh Associates LLC (SKGA) as to the accuracy or the reliability of the program. The user must carefully read this manual and thoroughly understand all the inputs parameters and must independently verify the results. In addition, in no event shall SKGA, or its employees or affiliates be liable for any indirect, incidental, consequential, or punitive damages whatsoever relating to the use of Anchor Pro.

REVISION HISTORY

Version 2.2.1

1. Corrected an error in the way the license information was displayed.

Version 2.2.0

1. Added support of TMS 402/602 standard up to its 2022 edition.

Version 2.0.2

1. Corrected a typographical error in the license statement that appears on the program interface and the PDF output.

Version 2.0.1

1. Corrected a typographical error in the Simple Output.

Version 2.0.0

1. Added a new option for a “Perimeter” arrangement of anchors.
2. Added input options for applied moments and torsion. The program will determine the anchors that are to be included in tension and shear analyses based on all applied loads.
3. Re-designed and improved program interface.
4. A new approach is employed to produce the output in order to mitigate conflicts with MS Office applications.
5. A new licensing scheme is employed which eliminates the need for a hardware lock.

INPUT INTERFACE

The input fields are mostly self-explanatory. However, a short description of each input field is provided below for better clarity. Different input fields are marked by item numbers, as shown below in Figure 1.

Quantities related to length (spacing, edge distance, diameter, etc.): inches
Material strength: psi
Applied load: Kips or Kip-ft

ANCHOR ARRANGEMENT

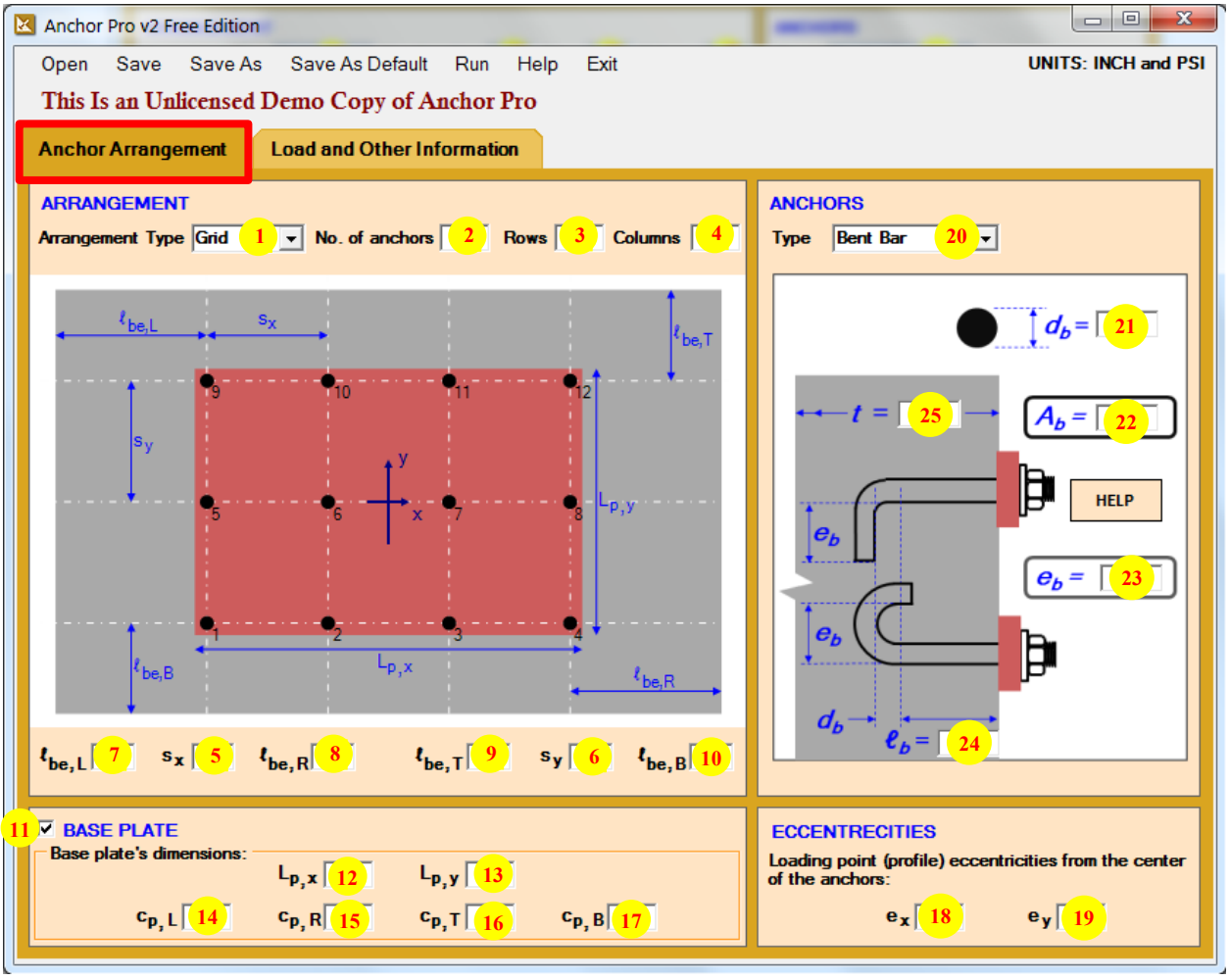

Figure 1. ANCHORARRANGEMENT input page of Anchor Pro

Item 1: Select the type of arrangement – grid (rectangular w/ middle anchors) or perimeter (rectangular w/o middle anchors).

Item 2: Total number of anchors, n, must be greater than or equal to one.

Item 3: Number of rows in which the anchors are arranged.

Item 4: Number of columns in which the anchors are arranged.

Item 5: Spacing of anchor columns, s_x.
This is automatically set as 0 when there is only one column of anchors.

Item 6: Spacing of anchor rows, s_y.
This is automatically set as 0 when there is only one column of anchors.

Note: For a *perimeter* arrangement, these values show the spacing of gridlines.

Items 7 through 10: Edge distances, in inches, on all four sides of the anchor or the anchor group.

Item 11: Select if there is a base plate. Specifying base plate parameters is required only when there are applied moments (including eccentrically applied tension) on a group of anchors, so that the program can determine the distribution of tension forces on the anchors. The baseplate itself is not designed by the program.

Items 12 and 13: Lengths of the base plate in x- and y-direction, respectively.

Items 14 through 17: Edge distances on all four sides of the base plate. Base plate must extend at least half an inch beyond the center of the edge anchors.

Items 18 and 19: Eccentricities of the applied load in x- and y-direction with respect to the center of a group of anchors.

Note: Anchor Pro v2 assumes all loads, tension and shear, are applied at a single point. In other words: *eccentricities of applied tension = eccentricities of applied shear force(s)*

Item 20: Select anchor type from the drop-down menu – headed bolts or bent (J- or L-) bars.

Item 21: Specify nominal anchor diameter, d_b, in inches. User can also click on the "Help" button to choose a standard diameter from a drop-down menu (See Item 22 for more detail).

Item 22: Specify the effective cross-sectional area of a single anchor, A_b, in square inches.

A calculator has been provided to facilitate the computation of A_b. Click on the "Help" button to open the calculator, which appears in a separate window (Figure 2). Effective cross-sectional area is calculated from the following formula:

$$A_{se} = \pi\,(d_o - 0.9743/n_t)^2 / 4$$

where n_t is the number of threads per inch of the anchor. In the calculator, user can type in a diameter (in inches) in the box provided or simply choose from a list of standard diameters from a drop-down menu. When a standard diameter is selected, the value of n_t is obtained automatically based on the selected thread type ("Coarse Thread" or "Fine Thread"). However, when the user chooses to enter a custom diameter, the value of n_t also needs to be specified.

Once A_b has been calculated, click "OK" to import the values into the corresponding boxes in the main window of the program.

User can also input a custom cross-sectional area directly in **Item 22**.

Item 23: If using a bent bar as the anchor, specify projected leg extension, e_b, in this box. See the diagram provided in the program interface for the correct way of measuring e_b.

Item 24: Specify the effective embedment depth, ℓ_b, of the anchor(s) in inches. See the diagram provided in the program interface for the correct way of measuring ℓ_b in a bent bar anchor.

Item 25: Specify the thickness of the masonry element where the anchor is attached, in inches.

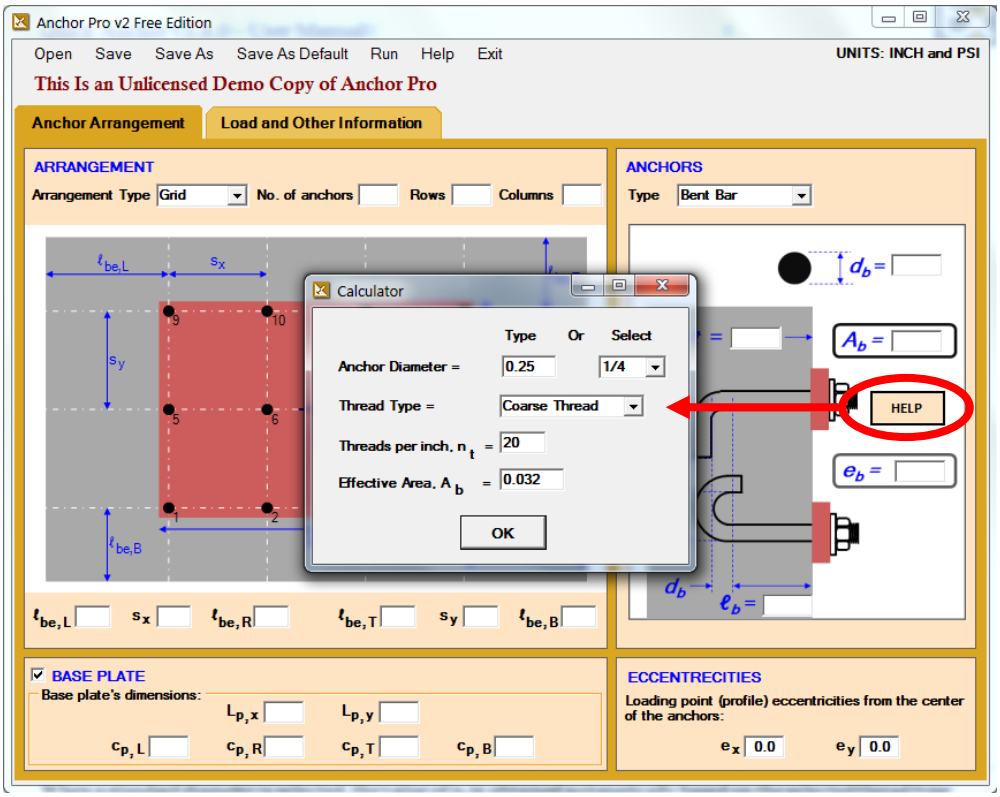

Figure 2. Calculator for determining A_b

LOAD AND OTHER INFORMATION

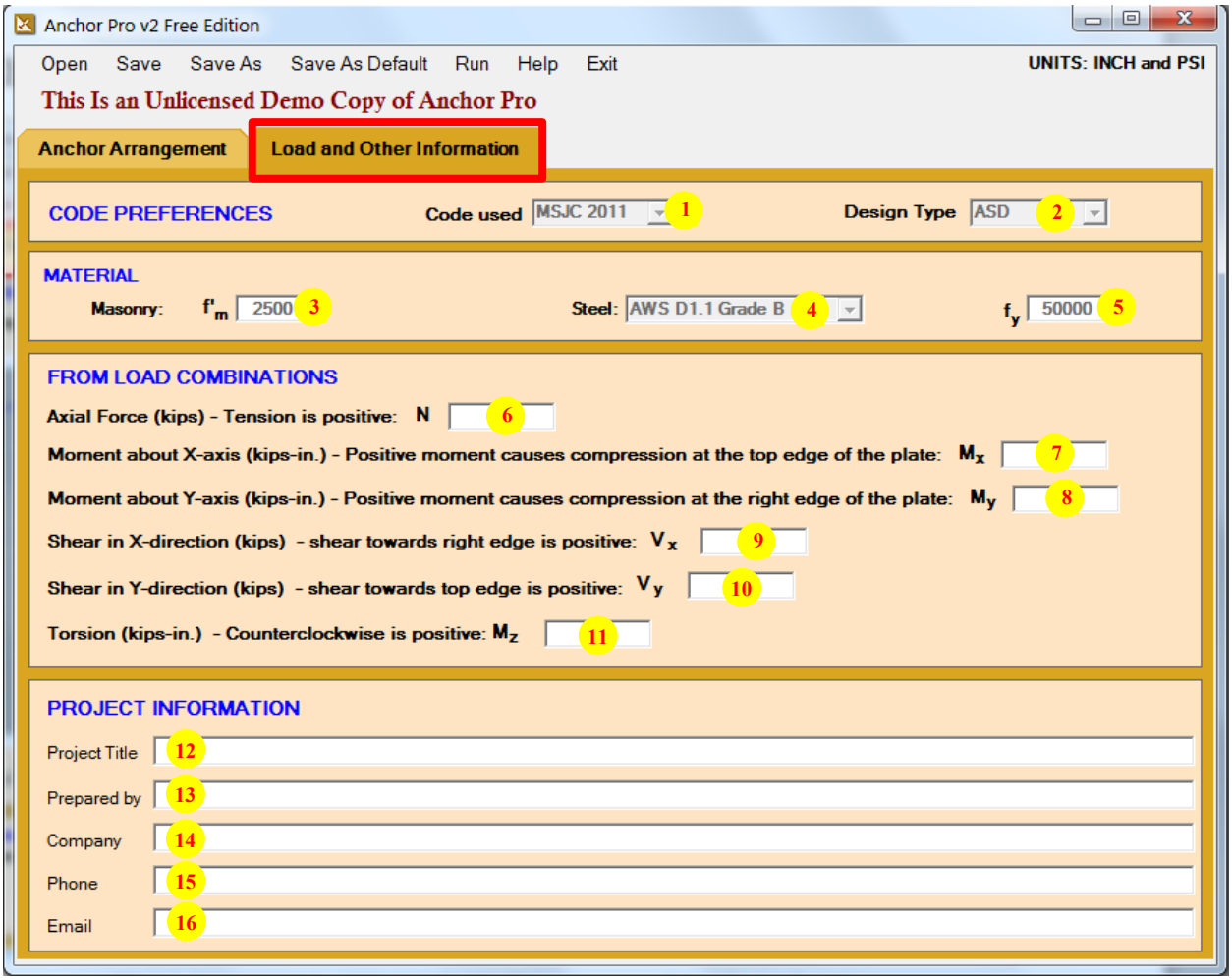

Figure 3. LOAD AND OTHER INFORMATION input page of Anchor Pro

Item 1: Select the version of the MSJC Code you are using.

Item 2: Select if the design is ASD or Strength Design using the drop-down menu.

Item 3: Specified compressive strength of concrete in psi.

Item 4: Select the anchor steel material from the four built-in options, or select "Other" to use a different material. When one of the four built-in options is selected, the specified yield strength of steel, f_y, (or tensile strength, f_u, when the 2022 edition of TMS 402 is being used) is automatically selected by the program, which appears in **Item 5**. When "Other" option is selected, user needs to specify f_y (f_u for TMS 402-2022) in **Item 5**.

Not all grades of steel are available for all types of anchors. For example, ASTM A 307 Grade A is for headed bolts only, and not for bent bar anchors. User should be careful when selecting anchor material for a certain type of anchors.

Item 5: Specified yield strength of anchor steel, f_y, in psi. When the 2022 edition of the MSJC code is being used, this value should be the tensile strength, f_u, in psi. Please read the description of **Item 4** above for more details.

Items 6 through 11: Specify the factored loads acting on the anchors as determined from the load combinations. Please note the correct sign for the desired direction of load application.

Items 12 through 16: *Project Info* fields can be used to enter the details of the anchor design project. These details show up on the header of the output reports.