

Scale Drawings for Plotting and Printing

CADD plotting and printing involves more than clicking “Print.” CADD uses a scale factor to plot or print drawings at an appropriate size. First, you must calculate the scale factor to scale the text, dimension the objects, and set the size of the model limits. Next, you select the plotter, the plotter settings, the pen settings, and the paper size. Finally, you can click “Print.”



Objective:



Review plotting and printing scale drawings in CADD.

Key Terms:



color table

hard copy

large-scale drawing

plot style table

scale factor

small-scale drawing

soft copy

style table

template

Understanding Scale Drawings for Plotting and Printing

You must know how to utilize scale drawings to succeed in plotting and printing.

PLANNING

In CADD, always draw at full size. The drawings can be plotted to a specific scale, determined by the size of the object to be plotted and the paper size. Many of the smallest scale drawings are found in civil engineering because most civil engineering drawings cover large areas of land and must be scaled down to fit onto a sheet of paper.

Small-Scale and Large-Scale Drawings

A **small-scale drawing** is an illustration that shows a large area. In contrast, a **large-scale drawing** is an illustration that shows a small area. Some of the large-scale drawings are for designed objects or electronics. These objects at full size can fit onto a sheet of paper. Drawings of electronics may even require plotting at larger than full-size scale to see all the information.

Small-scale and large-scale drawings represent areas of land, buildings, and objects. They can be measured in inches, feet, or miles. Some of the scales commonly used in small-scale drawings are 1 inch = 10 feet, 1 inch = 20 feet, and 1 inch = 50 feet.

Scale for the Final Plotted Drawing

Plan ahead and know the scale of the final plotted drawing *before* you plot. The planning must consider the following factors:

- ◆ The size of the paper for the final plot or print (Make sure the scaled drawing will fit on the paper.)
- ◆ The size of the object to be drawn (This step is necessary, as you need to make sure all the important features noted on the drawing are visible on the plot or print.)
- ◆ The height (or size) of the text when it is plotted (This is important because you want to make sure the text can be read easily.)
- ◆ The type of dimensioning to be used (This is important because you want to make sure all the dimensional information is visible.)

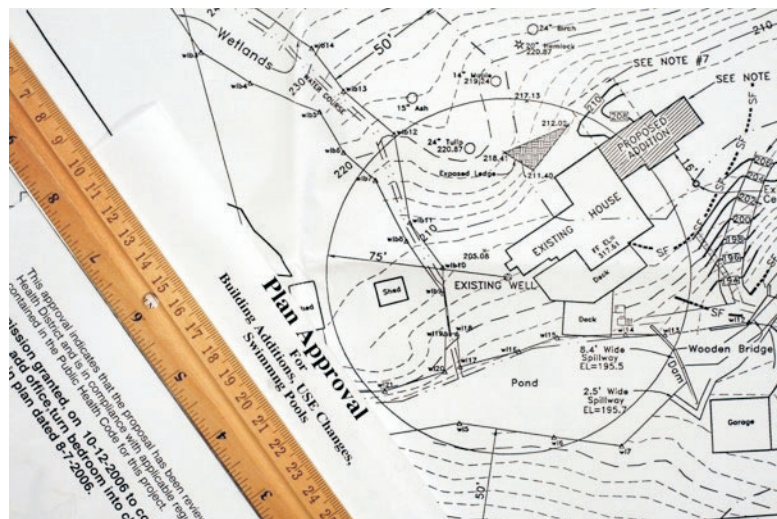


FIGURE 1. Some civil engineering drawings show large areas of land. To display the entire drawing, plot it at a scale that fits on the paper. You should be able to read the plot with a scaled ruler.

Again, plan the scale of a drawing before it is plotted because the plotted scale often has a significant effect on the size of certain drawing objects. Very large drawings will not fit on certain paper sizes. Also, ensure that drawings are not plotted too small, which may cause some important features and details to become unreadable. In some cases, you may need to create test plots to ensure that the final plot accurately displays the drawing.

SCALE FACTORS

A **scale factor** is a numerical value used in the scaling of text, dimensioning of objects (e.g., arrowheads, slashes, dimension text), and the size of the model limits. Your CADD drawings always contain objects and information drawn at full size or full scale.

The scale factor of a drawing must be planned in advance and is part of the CADD template. A **template** is a file that contains standard settings for drawings, such as text and dimension styles, layer names, and line types.



FIGURE 2. Determining the scale factor of plotted drawings may take some practice. The proper scale must be used, so double-check your equations.

The Scale Factor: Mechanical, Architectural, and Civil

Use the following steps to determine the scale factor of your drawing:

STEP 1: Decide upon the drawing scale for the plotted drawing.

STEP 2: Then calculate the scale factor by dividing the drawing units by the plotted units.
[Drawing units \div Plotted units = Scale factor]

For example, a mechanical scale calculation for a drawing with a scale of 1:2 (half-scale) is determined as follows:

$$1:2 \text{ scale is } \frac{1}{2} \text{ inch} = 1 \text{ inch}$$

$$0.5 \text{ inch (e.g., plotted units)} = 1 \text{ inch (drawing units)}$$

$$1 \div 0.5 = 2$$

$$\text{Scale factor} = 2$$

Architectural and civil scale calculations are often more difficult than those associated with mechanical drawings, but the principle is the same. Architectural and civil drawing scales often contain different units, such as $\frac{1}{4}$ inch = 1 foot and 1 inch = 200 feet. In these instances, you must first convert both numbers to the same unit. Once the conversion has been made, you can use the previously mentioned equations to calculate the scale factor. For example, the scale factor of an architectural drawing with a scale of $\frac{1}{4}$ inch = 1 foot would be calculated as follows:



FURTHER EXPLORATION...

ONLINE CONNECTION: The Drawing Setup Scale Factor

Determine the proper scale for the object being plotted and for the paper size. All drawings for a project must be printed using a common scale. To learn more about scale factors in CADD, watch the “AutoCAD Drawing Setup Scale Factor” video:

<http://www.youtube.com/watch?v=VayjrBES-OM>

STEP 1: Convert both units to inches. $\frac{1}{4}$ inch = 12 inches

STEP 2: Then calculate the scale factor by dividing the drawing units by the plotted units.

$$0.25 \text{ inch} = 12 \text{ inches}$$

$$12 \div 0.25 = 48$$

$$\text{Scale factor} = 48$$

SETTING UP A DRAWING FOR PLOTTING

Setting up a drawing for plotting involves selecting the plotter, the plotter settings, pen settings, and paper size. Most CADD programs have a sheet or page setup dialog box in which plotter configurations can be selected.

Drawings created by CADD programs exist in two forms: soft copy and hard copy. **Soft copy** is the electronic version of a drawing that appears on the computer monitor (e.g., the actual data file). In contrast, **hard copy** is a physical drawing produced on paper or some other medium by a printer or a plotter.

To set up a drawing for plotting:

STEP 1: Select the correct plotter in the sheet or page setup dialog box to begin a plot.

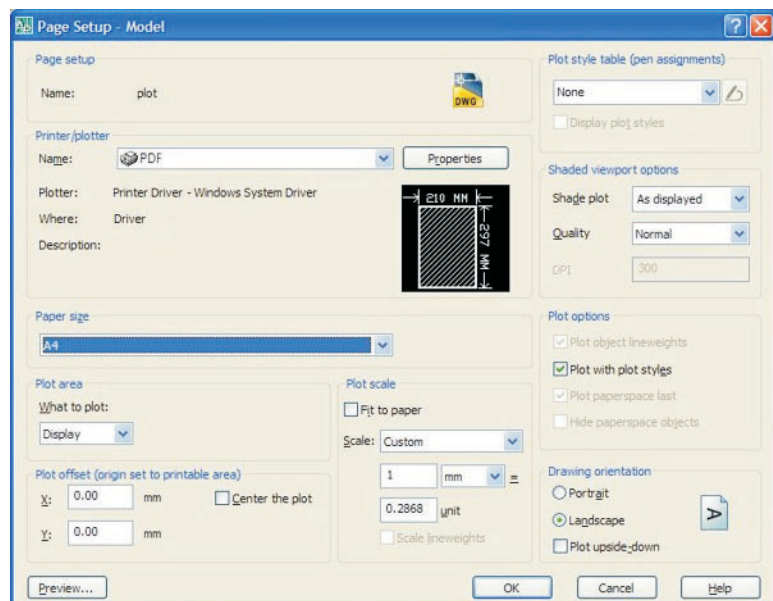


FIGURE 3. The page setup dialog box allows you to specify all the settings necessary to plot. Once you input the settings, save them for your next plot.

STEP 2: Next, specify the desired pen settings. To do this, assign a plot style table to the specific layout. A **plot style table** is a pen configuration that allows the designer to have total control over how the drawing appears when plotted. Two types of commonly used plot style tables are color table and style table.

A **color table** is an item that assigns different pen values to the colors in the CADD program. A **style table** is an item that consists of names with pen settings that can be assigned to objects or layers.

STEP 3: Send the drawing to the plotter.

You can plot drawings to an electronic file. Typically, this is done to allow a drawing to be published over the Internet and viewed through a Web browser. All CADD programs have a format or utility for sharing and viewing files.

Summary:



Drawings in CADD should always be drawn at full size. They can be plotted to a specific scale. Important considerations when plotting are the size of the paper, the size of the object to be drawn, the height (or size) of the text when it is plotted, and the type of dimensioning.

A scale factor is a numerical value used in the scaling of text, dimensioning of objects (e.g., arrowheads, slashes, and dimension text), and the size of the model limits. The scale factor of a drawing needs to be planned in advance. First, decide upon the scale. Then find the scale factor by dividing the drawing units by the plotted units. Mechanical drawing scales are usually different than architectural or civil engineering scales.

Setting up a drawing for plotting involves selecting the plotter, the plotter settings, pen settings, and paper size. This can be done in the sheet or page setup dialog box. Pen settings are set up in the plot style table. Two common plot style tables are a color table and a style table. Either may be used to set pen settings.

Checking Your Knowledge:



1. What is the difference between a small-scale drawing and a large-scale drawing?
2. Describe the use of a scale factor in CADD.
3. Describe the two forms of drawings created by CADD.
4. What does a template contain?
5. What are two common plot style tables?

Expanding Your Knowledge:



One way to learn how to plot in CADD is to follow along with a tutorial. Many tutorials are available online. Search the phrase “How to plot a drawing in CADD.” Then follow along with the tutor and the images.

Web Links:



AutoCAD Plot

<http://www.cad-notes.com/5-steps-preparing-your-autocad-plot/>

Annotation Scales

http://www.youtube.com/watch?v=dcNk1-i_cuk

Saving Your Page Setups

http://autocadinsider.autodesk.com/my_weblog/2005/12/save_your_page_.html