

AutoCAD 2013 Tutorial

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AUTOCAD SET UP

1. INTRODUCTION & GENERAL SET UP

AutoCAD is a very useful application for drafting. It can be used on its own or associated to a variety of other applications for further purposes, for example importing a drawing into a different application for further study.

Certain set ups in AutoCAD will facilitate its general use and ensure that drafting can be executed in a timely manner. Figure 1 show a general screen set up. Main tools in AutoCAD are circled in red in the figure, and listed below.

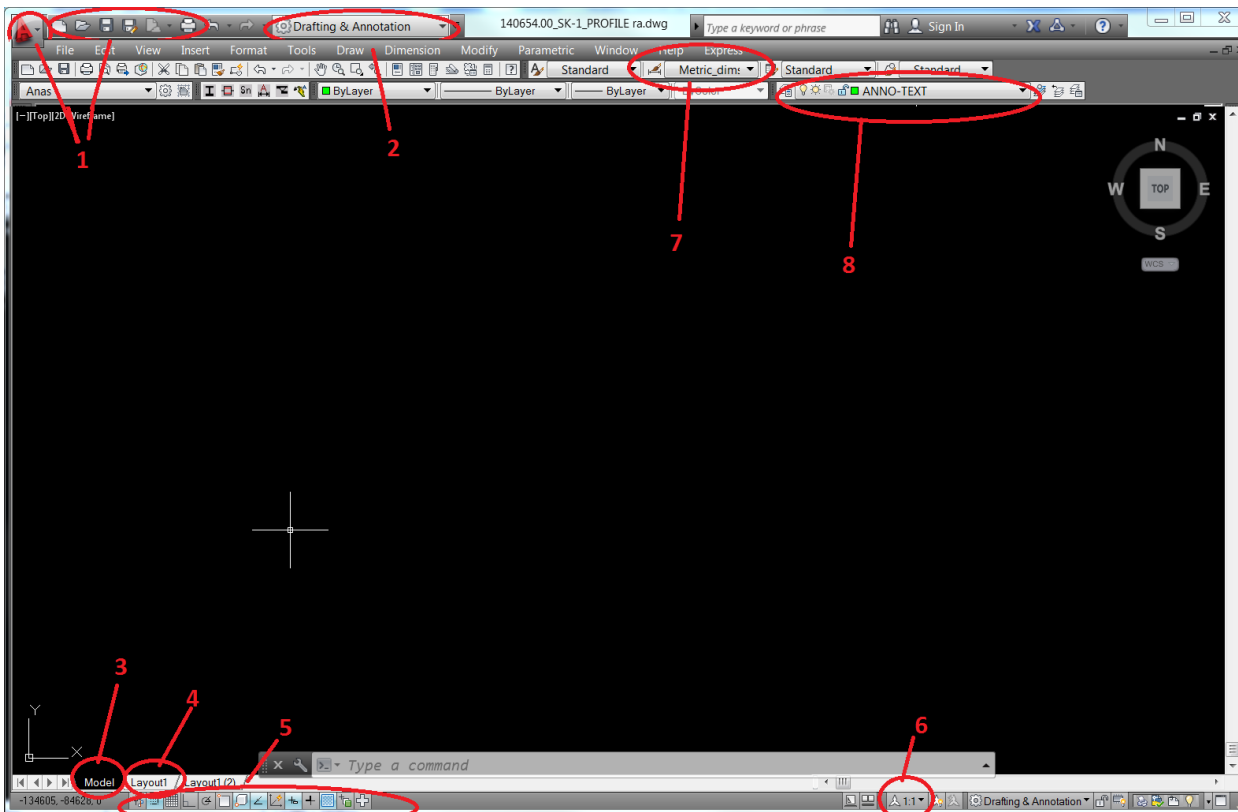


Figure 1 – AutoCAD main/general screen.

Where:

- 1 – AutoCAD basic buttons (save/open/print)
- 2 – AutoCAD screen layout (generally set to AutoCAD classic)
- 3 – Model Space tab (it may sometimes be hidden)
- 4 – Paper Space (Layout) tab (it may sometimes be hidden)
- 5 – AutoCAD assistance tools (F3 – Snap ON/OFF; F8 – Ortho mode)
- 6 – Scale
- 7 – Dimstyles (Text Styles)
- 8 – Layers

1.1 How to change the color of your cursor

If you are working on a drawing with a PDF background, it helps to change your cursor to a different color so that it doesn't get lost in the drawing.

Steps

1. Switch your workspace to AutoCAD Classic. This is done through the dropdown with the gear symbol in the top left corner of your window.
2. Go to the Tools dropdown and click on options.
3. Click on the 'Drafting' tab and hit the 'Colors...' button.
4. Under Interface element click on 'Crosshairs' and choose your preferred color.

1.2 Install or Re-Install SGH Tool Palette Groups

SGH Tool Palettes provide a large number of commonly used items so that you do not need to draw them every time you use them, ranging anywhere from breaklines to hatches to channel sections. Tool palettes also have title blocks and such.

Steps

1. Open AutoCAD 2013.
2. Select Tools > Options (or use the command 'Options').
3. In the Options window, select the right-most tab "Profiles".
4. Click on "Import" and go to:
I:\BOS\Drafting Standards_AutoCAD Shared_Setup\ACAD2013-BOS Network
5. Select ACAD2013-BOS Network and click "Set Current". Close the Options window.
6. You can now access the SGH Tool Palettes from Tools > Palettes > Tool Palettes, or from the palette in itself (Figure)

1.2.1 How to use Tool Palettes & Dim styles.

As previously mentioned Tool Palettes are very helpful. Title Blocks, dimension styles (dim styles), and other drawing blocks can be brought from it – instead of having to be drawn every time.

Once a drawing is started, it starts without any dimension style (Figure). To import new dim styles, simply click on the dim style you are searching on the Tool Palette and place it on your model space. Once certain dim styles are imported, the Dim Style Control box should look similar to Figure .

Note that, in general a drawing has a scale in which it will be plot. By selecting the appropriate dim style, not only annotations & text will be on the appropriate scale, but anything imported onto CAD (for example a Title Block, or a Section Title from the Tool Palette) will then have the scale associated to that dim style.

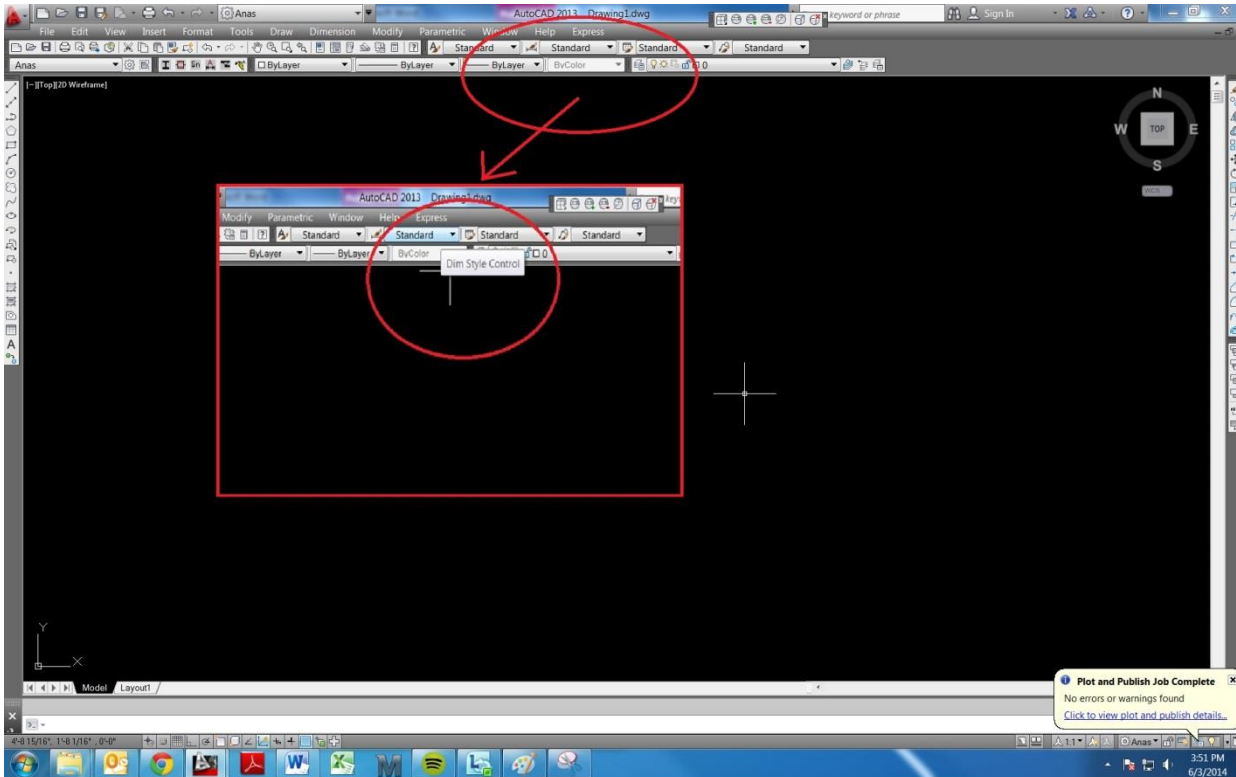


Figure 2

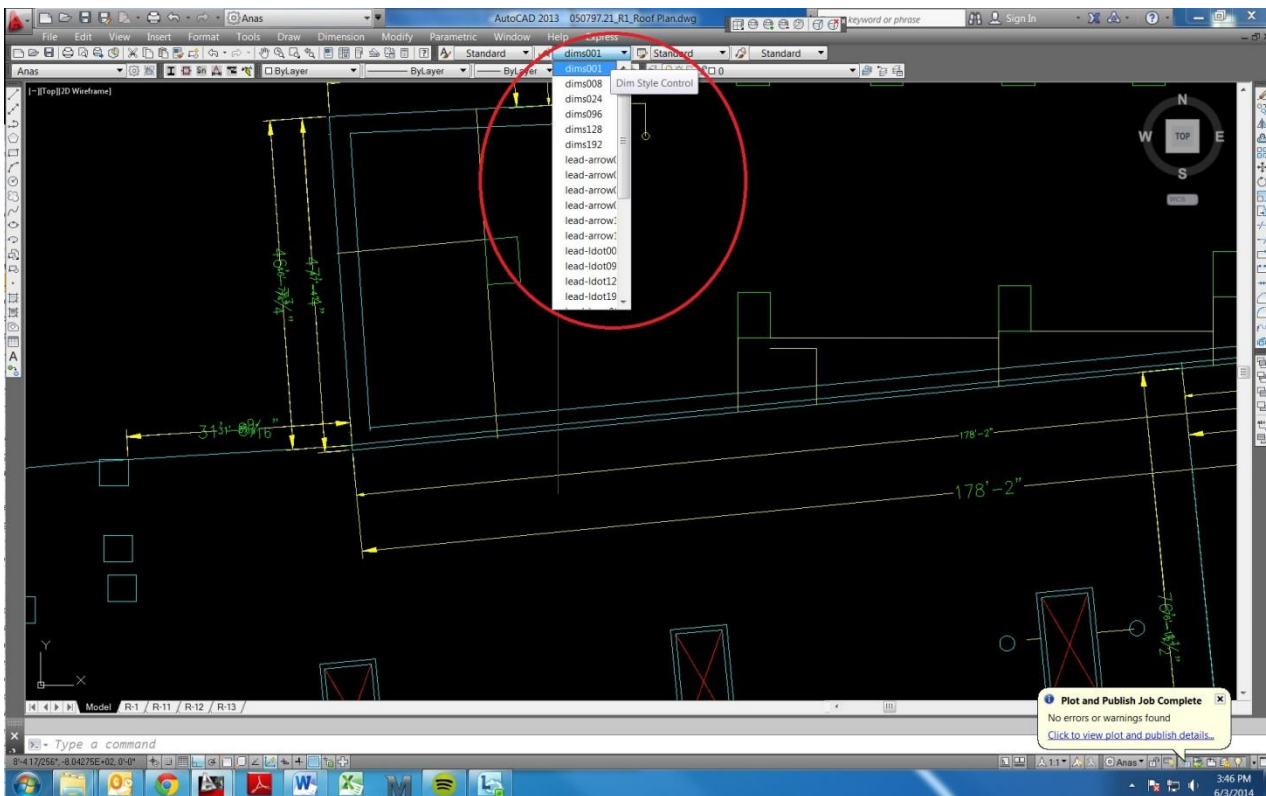


Figure 3

1.3 Recommended Screen Setup

1.4 How to add SGH's standard Layers

In general, drawings are made using different layers in order to differentiate the different materials & conditions of what is being drawn. SGH like other companies have standard layers for its different divisions (and its different uses). To import the layers:

Steps

1. On the Tool Palette, **right click** on the bottom of your tool palette and select SESM.
2. Once on the SESM Tool Palette > On top of the palette click and place the SGH layer needed on the model space.
3. The layers imported should now populate your layer properties manager box.

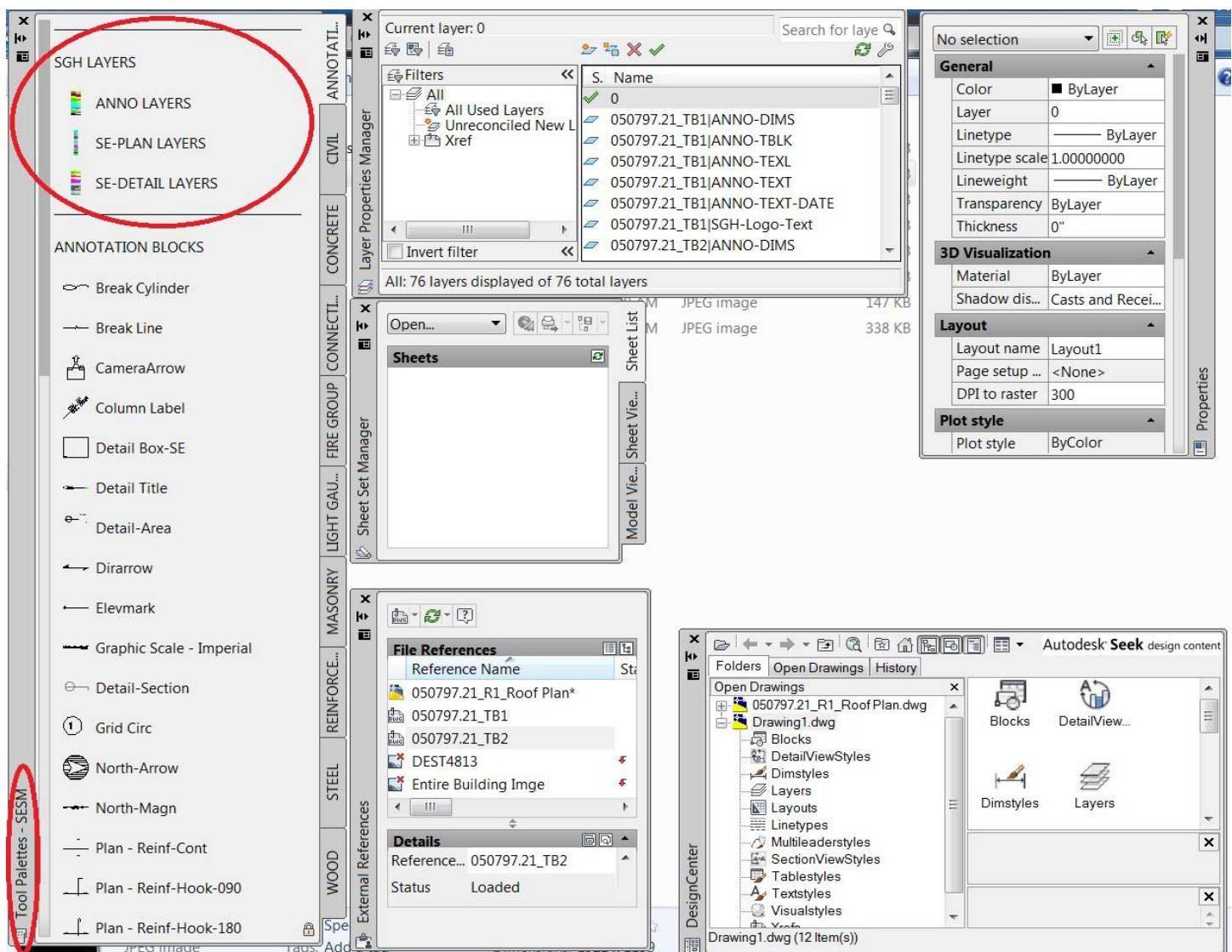


Figure 4

1.5 Model Space Setup

Generally, any work done in AutoCAD is done in the Model Space. Normally, it has a scale of **1in**, that is, if you draw a line with a dimension of 1, it will be 1 in long. For a better understanding of scales please read Scales in this manual.

1.6 Paper Space (Layout) Setup

Once a drawing is done it can be opened in the paper space in order to be plot. Three main reasons why paper space is used for plotting:

1. Layouts can have specific configurations set up:

The paper space can be set to print exactly what you need. It can have different dimensions (Ex: Letter size 8.5x11 or D-sized paper 36x24), and different orientations (landscape or portrait). Further, a drawing (from model space) can have multiple layouts (multiple pages), with different configurations. It is SGH's standards to have one layout per drawing, however, for smaller drawings (11x17 or 8.5x11) multiple layouts for a drawing are allowed (Please check with your head Drafter).

1.6.1 How to setup paper space dimensions & orientation

To set up the paper space dimension follow the following steps.

Steps

1. **Right click** on the Layout tab on the bottom of the screen (Figure 5).
2. The "Page Setup Manager" dialog box will pop up (Figure 6). Click **Import**.
3. The "Select Page Setup From File" dialog box will pop up (Figure 7). **Locate** the location of AutoCAD templates on your computer. Currently, templates can be found at I:\BOS\Drafting Standards_AutoCAD Shared_Templates . Once the location cited above is found, the dialog box should look like the one in Figure 4. In this case, **click Boston Templates**, then, select a template, such as BT-E-Land-42x30_2006. Click **Open**.
4. The "Import Page Setups" dialog box will pop up (Figure 8a). Select the style you'd like to use and click **OK**.
5. The "Page Setup Manager" dialog box will show up again (Figure 8b). Select the layout chosen and click **Set Current**. The selected page setup details are displayed on the bottom of the dialog box as shown in Figure 8b. Click **Close**.

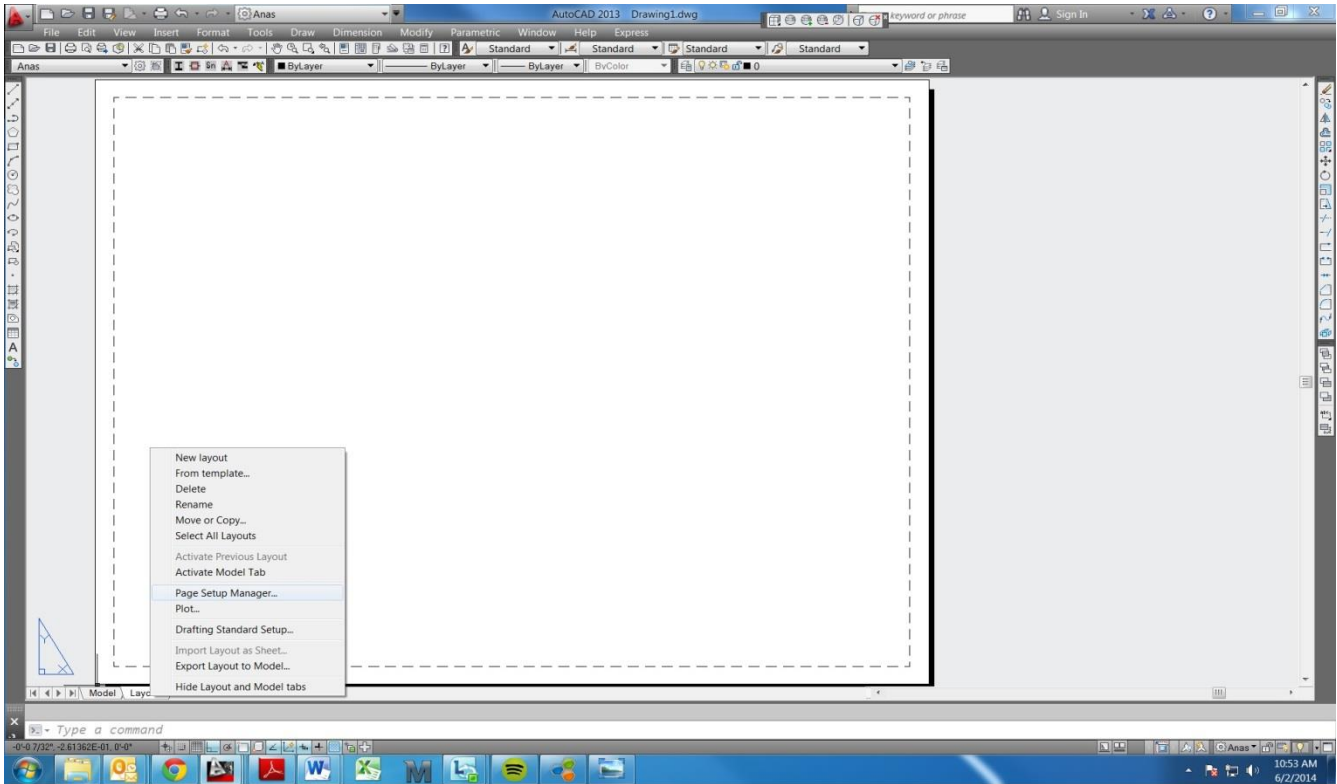


Figure 5 – How to setup paper space dimensions & orientation

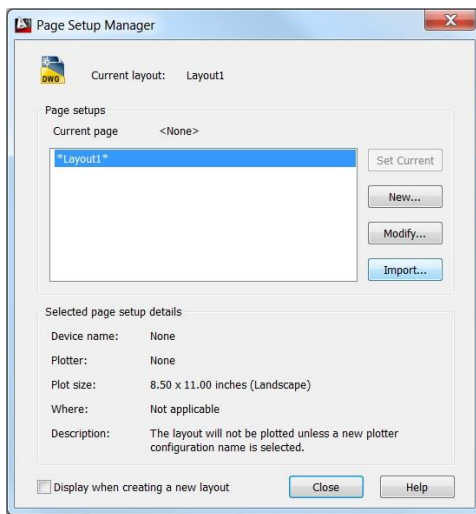


Figure 6 – Page Set Up Manager

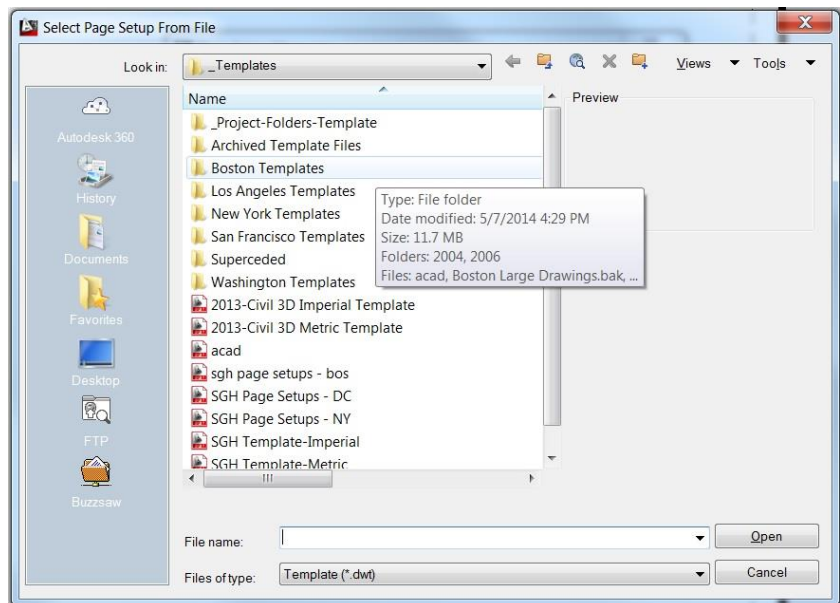


Figure 7 – Select Page Set Up from File

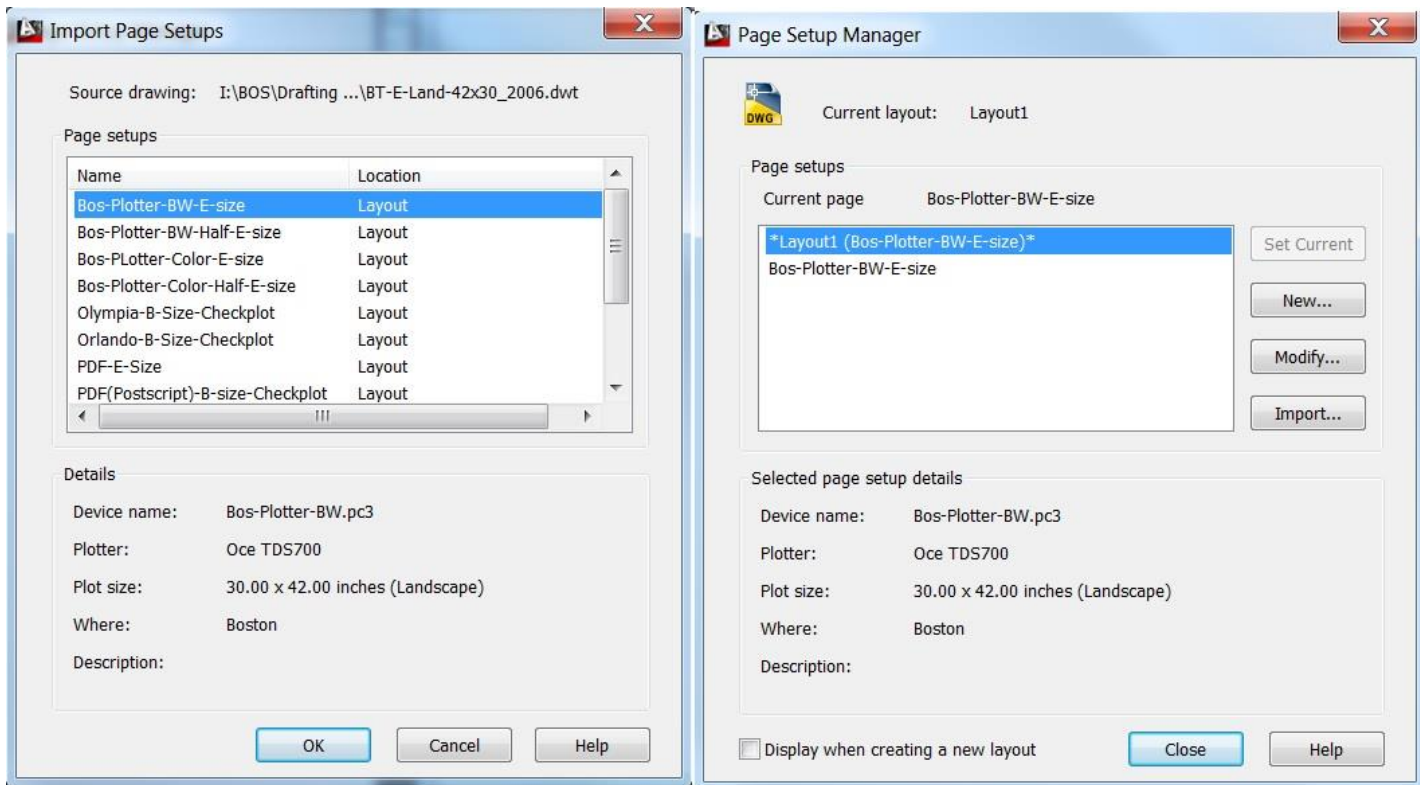


Figure 8a/b- Import Page Setups & Page Setup Manager

2. Layouts can have specific project templates:

Templates (Or how the page will look like once it is print) can be done and brought into paper space. For instance, a drawing block (DB are drawings that were previously made and can be inserted onto any space) of a template can be inserted to the page.

In general, a drawing template is “x-referenced” into the layout. For larger projects (or projects with multiple drawings) “X-ref” is generally preferred for innumerable reasons. First, a general template can be created for all project drawings being worked on.

Please note that layout/paper space tabs, can be copied and paste (thus making your job of creating many similar layouts faster).

1.6.2 How to make a template/ layout

1.6.3 How to X-Reference a template

3. Paper Space can show multiple drawings with or without different scales:

In order to bring drawings into paper space, viewports are created. A page can hold multiple viewports and each one of those can hold different configurations (for example it can have different scales).

1.6.4 How to create/edit viewports

2. SCALES

3. INSTALLING AUTOCAD APPS

There are many AutoCAD application files that have been created to reduce the amount of time it takes to perform routine (and sometimes complicated) tasks. For example, there is no standard command in AutoCAD that can tell you the combined length of multiple objects. However there are many applications that have been written to perform just such a task. It is simply a matter of finding whatever application you need, whether internally, or on the internet.

Steps

6. The first task is to find a “.isp” file which is the application you will need to have on your computer. One way to find .isp files is simply to search for them on google by describing the task you wish to complete (such as “How to find the length of multiple lines in autocad”) or specifically you can look on Autodesk discussion groups (discussion.autodesk.com).
7. Several example files have been placed in the same folder as this manual. The file “length.isp” calculates the total length of many lines; “tparea.isp” calculates the total area of many objects; “hatchb.isp” draws the boundary of a borderless hatch.
8. Save the .isp file somewhere convenient for you to find, such your desktop or user space.
9. In AutoCAD type the command “appload”. A new window should appear.
10. Browse to the .isp you wish to add and select “Load” and close the window.
11. You should now be able to use the application by typing the command, which will be the same as the filename of that application.

4. LOADING STEELPLUS

Steel plus is a useful application which allows you to import steel shapes as pre-drawn blocks. You can choose the type of shape (w-beam, angle, channel, etc.) and the size that you want. There is also an option to see the

member in plan, elevation, or section. This will save you a lot of time if you are working on drawings that contain steel members.

Steps

1. Switch your workspace to AutoCAD Classic. This is done through the dropdown with the gear symbol in the top left corner of your window.
2. Go to tools >> customize >> interface. A dialogue box named 'Customize User Interface' will appear.
3. Click on the folder symbol next to the 'All Customization Files' dropdown.
4. Go to:
I:\BOS\Drafting Standards_AutoCAD Shared_Utilities\stlplus-1\VR14
5. Click on the CUIX file named STL14WIN and hit open.
6. In the Customize User Interface box hit Apply and then OK.
7. A box should appear in your toolbar with steel shapes on it. If not, right click on an empty area of your tool box and highlight STLPLUS. Choose Steel PLUS VR14.

5. IMPORTANT STANDARDS

1. Always work on drawings in the appropriate sub folder under the Working_Set directory. (i.e. _Elevations, _Sketches, etc.) In general, do not make copies of the drawings to work off of because you cannot control who makes alterations to the original in the meantime.
2. Avoid overriding dimensions to make them say what they ought to be. If the dimension is wrong, fix the drawing.
3. When drawing hatches, it usually beneficial later on in the project if you make the hatch associative to the borders of the area. This can be completed by checking off the "Associative" box under Options in the Hatch window. Now if you move the corner of the border (either by selecting a point on the polyline, or selecting two intersecting lines and move the corner) the hatch will expand or crop with it. Note: This does not apply to AutoCAD 2010 or later versions, where hatches are automatically associative.

HOW TO

1. START NEW DRAWINGS

When starting a new drawing, you should usually begin with one of the SGH Templates because they will have all of the standard layers, page sizes, dimension styles, etc. that you may need for your drawing.

Steps:

1. Open a new file (File > New).
2. If the Templates directory is not open, it can be found under: I:\BOS\Drafting Standards_AutoCAD Shared_Templates\. You may be required to change the “file type” drop down menu to a drawing template file (.dwt). You should now see a list of templates.
3. You will probably want one of: “2006_Desi Template – Detail” (for doing details) or “2006_“Desi Template – Plans” (for plans or elevations). Open the desired template.

2. CREATING VIEWPORTS

2.1 How To Set Viewports To The Right Scale

When you create a viewport to display part or all of your drawing in model space you will need to scale it correctly (unless the drawing is intentionally drawn not-to-scale).

Steps

1. Double click in your viewport to activate modelspace in that view port.
2. Center the drawing on what you want to show and type ‘z’ and hit enter to zoom the drawing.
3. For the next step you need to know the scale factor for the drawing scale you wish to have (i.e. 12 for 1”=1’-0” scale, 16 for ¾”=1’-0”, etc.). The scale factor can be found by the following formula:

$$\text{Given } x/y = 1'-0'',$$

$$\text{Scale factor} = 12y / x$$

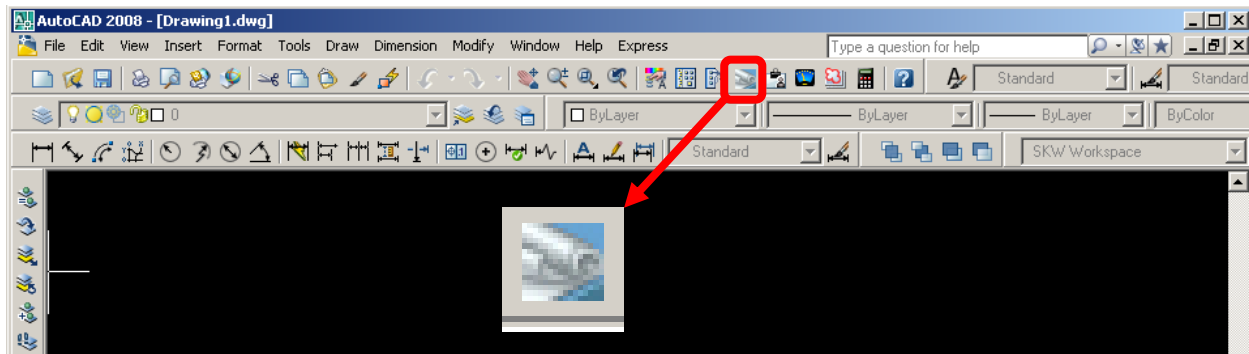
4. Type “1/##xp” and hit enter, where ## is replaced by your scale factor. If you have your page setup set correctly, your drawing in that viewport will now appear as the correct size when plotted.

3. HOW TO CREATE A SHEET SET

Sheet Sets are a useful tool to help you manage and print many drawings at one time.

Steps

1. Start the Sheet Set Manager by clicking on:



2. From the drop down menu at the top of the Sheet Set Manager, select "New Sheet Set...".
3. Select "Existing Drawings", and click next.
4. Type in the name of the sheet set, which should be in the format: project # - keyword (ex. 090674 – LARZ).
5. Store the sheet set data file (.dst) under: ...\\Drawings\\Working_Set_Support\\ and click next.
6. Browse to the folder where the drawings you wish to add are located. Once you have selected the folder, you can deselect any layouts you do not wish to have. Browse to all the folders you wish to add, and then click next.
7. Check which drawings have been added to your sheet set and click finish.
8. To add more layouts after you have created the Sheet Set, right click on the name of the sheet set in the Sheet Set Manager (or on any one of the layouts under that, which will insert the new layouts beneath that point), and select "Import Layout as Sheet...".

4. MAKING A NEW SECTION SHEET

5.

6. FORMATTING

6.1 Changing Page Size of Layout

It is important to properly manage your drawing sizes so that the drawings can be properly scaled. The commonly used page layouts have been setup for to reference provided the drawing was started from an SGH Template.

Steps

1. Right click on the tab of the layout you wish to edit.
2. Select "Page Setup Manager."
 - a. The page setup determines the features of your layout. It sets the default printer (Plotter BW, Plotter-Color, or print to PDF), the size of the drawing (A through F) and whether the drawing will print to the Full size of your layout or Half the size. Selecting Full or Half size will not affect the size of your drawing in AutoCAD, only the size of paper to which it will plot.
3. The following summarizes the standard page setups:

Page Setup	Page Size (in AutoCAD)	Page Size (Actual size when plotted)	Color
Bos-Plotter-BW-D Size-Full	36 x 24 in.	36 x 24 in.	Black and White
Bos-Plotter-BW-E Size-Full	42 x 30 in.	42 x 30 in.	Black and White
Bos-Plotter-BW-E Size-Half	42 x 30 in.	21 x 15 in.	Black and White
Bos-Plotter-BW-F Size-Full	48 x 36 in.	48 x 36 in.	Black and White
Bos-Plotter-BW-F Size-Half	48 x 36 in.	24 x 18 in.	Black and White
Bos-Plotter-BW-E Size-Full	48 x 30 in.	48 x 30 in.	Black and White
Bos-Plotter-Color-D Size-Full	36 x 24 in.	36 x 24 in.	Color
Bos-Plotter-Color-E Size-Full	42 x 30 in.	42 x 30 in.	Color
Bos-Plotter-Color-E Size-Half	42 x 30 in.	21 x 15 in.	Color
Bos-Plotter-Color-F Size-Full	48 x 36 in.	48 x 36 in.	Color
Bos-Plotter-Color-F Size-Half	48 x 36 in.	24 x 18 in.	Color
Bos-Plotter-Color-E Size-Full	48 x 30 in.	48 x 30 in.	Color
PDF-A Size-P	8.5 x 11 in.	8.5 x 11in.	Color (PDF)

PDF-B Size-L	17 x 11 in.	17 x 11 in.	Color (PDF)
PDF-C Size	24 x 18 in.	24 x 18 in.	Color (PDF)
PDF-D Size	36 x 24 in.	36 x 24 in.	Color (PDF)
PDF-E Size	42 x 30 in.	42 x 30 in.	Color (PDF)
PDF-F Size	48 x 36 in.	48 x 36 in.	Color (PDF)

4. If you are missing any of the above set ups (i.e. possibly because the drawing was created by another company), you can import them by:
 - a. In the Page Setup Manager, select Import.
 - b. Select 2006_DESI TEMPLATE - PLANS.dwt
 - c. Select the layout, or Shift + Select for multiple layouts
5. Select the layout you wish to use and click the “Set Current” button to apply your changes to your selected tab.

6.2 Stacked Fractions

Unless otherwise specified, fractions should always be written as $\frac{1}{2}$ rather than 1/2. There are at least 2 ways to do this.

Steps

1. When using mtext, the fractions should correct themselves. However, this will usually not work with leaders unless you retype the fractions by editing the text.
- Or,
2. Type “|Q3|w/|A4|s” which will appear as $\frac{3}{4}$.

6.3 Viewports & Appropriate Scales

7. HOW TO PLACE LEADERS

Leaders are often adjusted and move around in drawings when information is added or removed to maintain the clarity of the drawings. Thus it is very important to correctly create your leaders so that the automatically adjust and display properly.

Steps

1. Make sure you have the right Dimension Style selected (see the AutoCAD tutorial).
2. Select the starting point of your leader (where the arrow will point to).

3. Draw lines of the leader (usually just one) but do not draw the small horizontal line that will run parallel to the text.
4. Press the Space Bar, or Enter, twice and then type in your text. Now when the leader is moved, the lines will adjust automatically adjust themselves.

7.1 Superscripts & Subscripts

There are at least half a dozen ways to get superscripts and subscripts but one easy way is as follows:

Steps

1. If you want to produce “James^{Awesome}”, first type “JamesAwesome^ ” in your text box (be sure to add the space at the end).
2. Highlight “Awesome^ “, right click on it and select ‘Stack’. The text should now appear as a superscript.
3. To get a subscript, type “James ^Awesome”, highlight “ ^Awesome” and select ‘Stack’.

8. CREATE AND EDIT BLOCKS

One of the key advantages of creating a block is that you can change the block later and it will update all instances of it within your drawings. Since it is very common to go back and edit minor details in your drawing, instead of having to make the changes multiple times in model space, you can edit it once as a block and all of the copies will be automatically updated.

Steps

1. Type the command ‘be’. The Edit Block Definition window should pop up.
2. To create a new block, simply type a new name of your block into the ‘Block to create or edit’ box and click OK.
3. To edit an existing block, select it from the list or type in the existing name, and click OK.
4. The block editor will now open and you can create the item(s) of your drawing that will be contained within that block.
5. To set the reference point from which your block will be inserted, type ‘bparameter’, then type ‘b’ for base and select the point.
6. When finished, select ‘Close Block Editor’ and select ‘Yes’ to save the changes to block.
7. To insert a block into your drawing type ‘i’ and select the name of the block. Generally, only the check boxes for “Specify On-screen” and “uniform scale” should be checked.

8. You can always go back and edit all of instances of a block in your drawing at the same time by using the block editor ('be'). If you wish to edit just instance of the block, select that block in your drawing and type 'explode'. That item in the drawing will no longer be connected the block in any way.

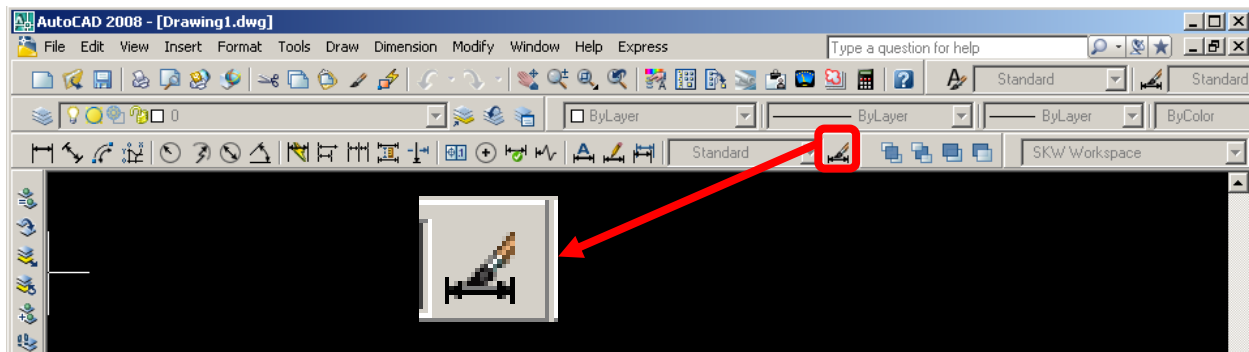
9. ADD NEW DIMENSION STYLES

Usually when adding leaders you can use one of the existing dimension styles (such as dims008, or lead-arrow016, etc.), however there are times when you may require a different style. For example consider if you wished to use a 1/16"=1'-0" scale which has a scale factor of 192:

Note: These steps assume you already have the standard SGH dimension styles in that drawing. If you do not, see How to import standard dimension styles.

Steps:

1. Start the Dimension Styles Manager by clicking on:

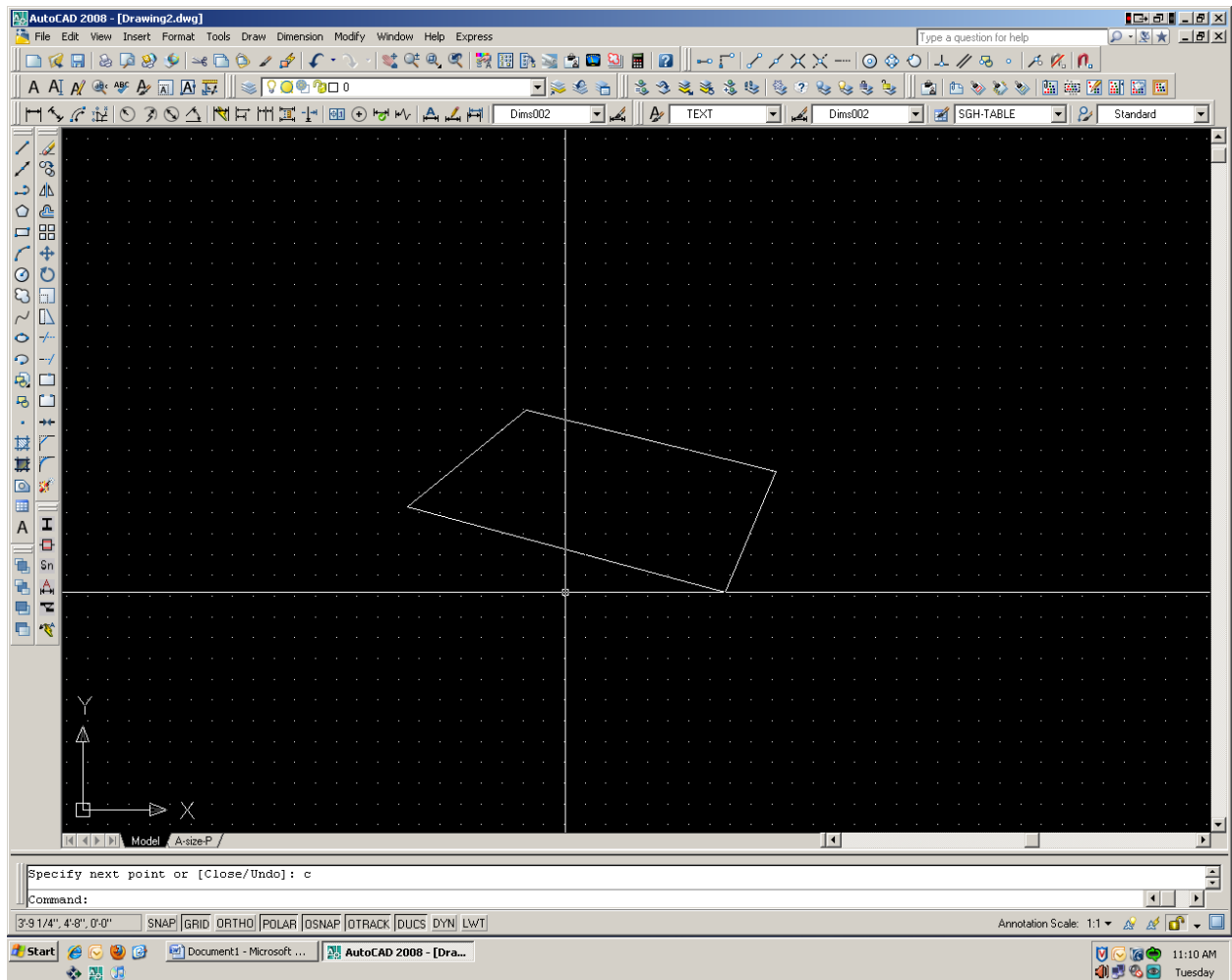


2. Click on 'New...'
3. Change the 'New Style Name:' to "dims192" and change 'Start With' to any of the existing "dims###". Click 'Continue'.
4. Under the 'Fit' tab, set the 'Use overall scale of:' to 192. This will automatically correct the size all lines, arrows and symbols, and text.
5. Repeat this process for all the leader types you need to use (i.e. lead-arrow, lead-loop, etc.) but be sure to change the 'Start With' entry to one of the existing dimension styles that already has the correct end symbols (arrows, loops, etc.).
6. You can also modify other aspects other than the scale of the dimension styles using the Dimension Style Manager. However this is not generally recommended to ensure that the leaders and dimensions match SGH's AutoCAD standards.

10. CALCULATE MASS & AREA PROPERTIES

The following outlines steps for determining the mass properties of a shape by cross-section. The massprop command will give you information such as area, perimeter, centroid, moments of inertia, and radii of gyration.

The first step is to draw a section of the shape you need properties for. Here is an example:



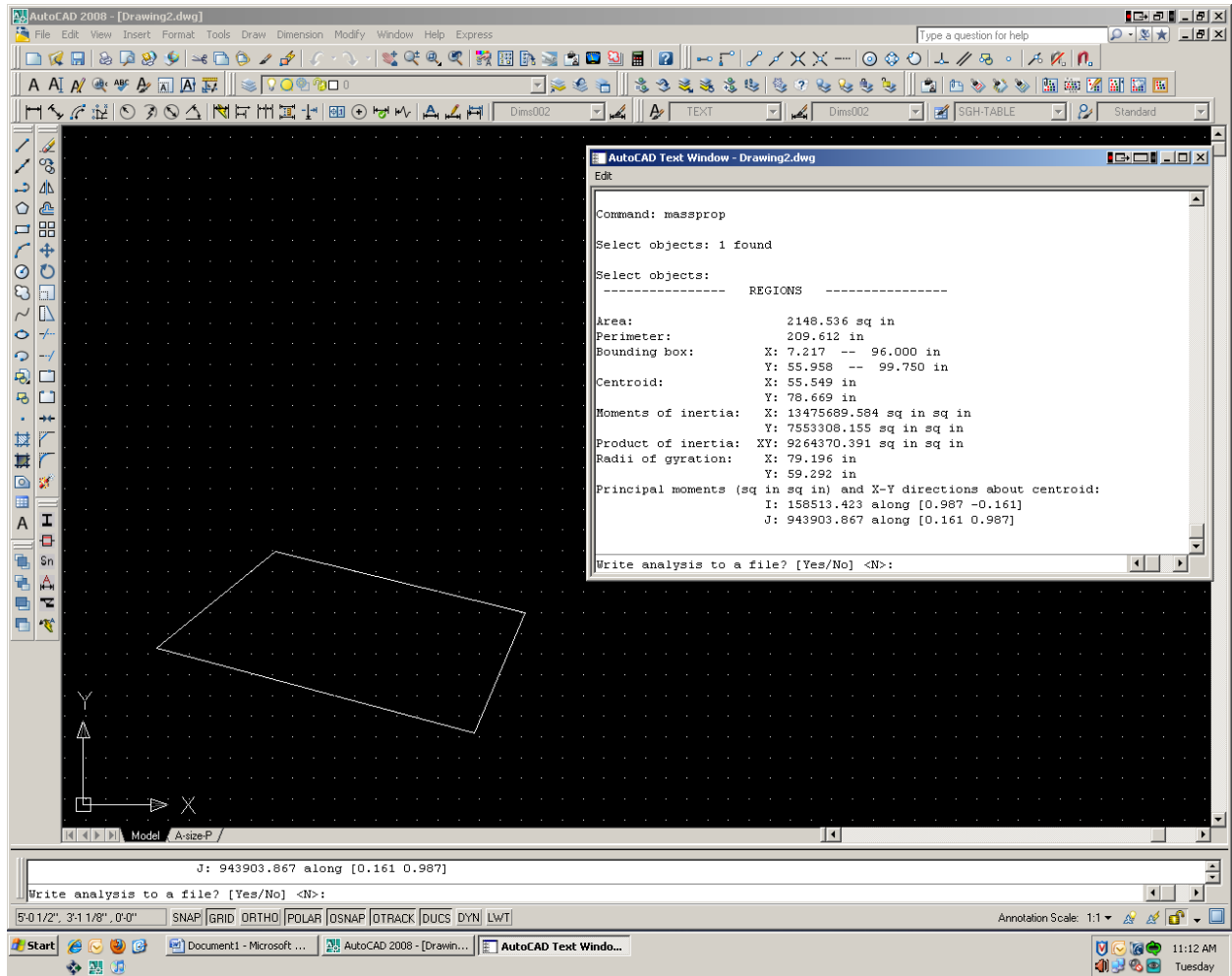
You can draw the shape with draw tools such as line, circle, rectangle, arc, or you can use polylines. Eventually, you need the shape to be one object, so if you used polylines then you are a step ahead.

If you used other draw tools, you can turn your shape into a single object by typing “bpoly” and selecting “pick points.” Just like a hatch pattern, you want to click a point in the interior of the shape boundaries. Then hit “ok.”

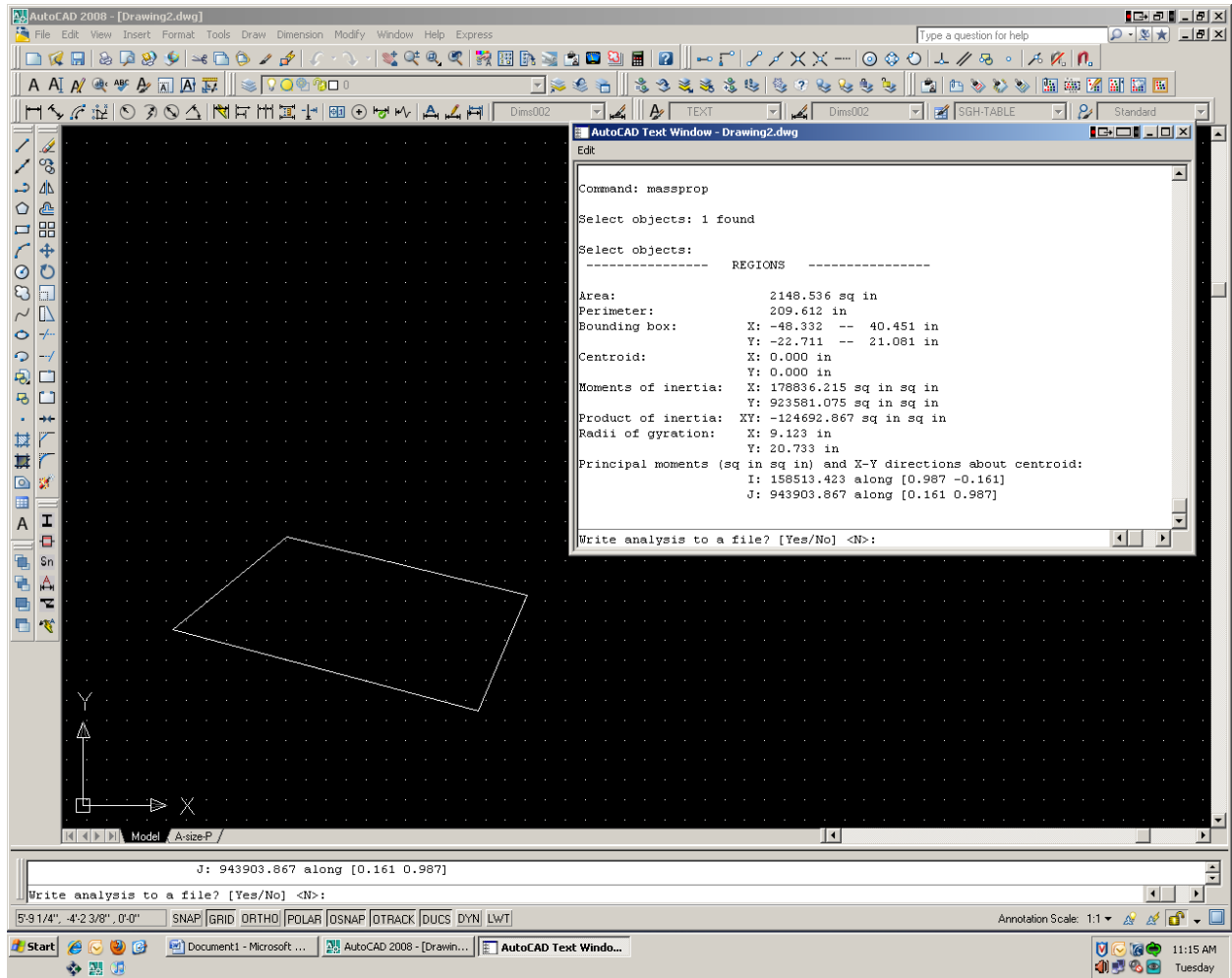
Now you will notice that all of the pieces of your shape are connected. Bpoly creates a new shape over your existing lines, so you will want to erase the original pieces. You can send the polyline shape to the back and the pieces will show up over the polyline and you can delete them.

Now that you have a single object, you want to create a region. Type “region” into the command window and it will ask you to select objects. Select your polyline and hit enter.

Now that you have a region, you can find the properties of this shape by typing “massprop” and selecting your region. A new window will appear with various properties of the shape: area, perimeter, etc.:



Note that the moments of inertia of this shape are taken from the origin and are not accurate unless the centroid of the shape is located at the origin. To obtain the true moments of inertia, write down the centroid coordinates displayed in the properties menu. Next use the move command and type in the centroid coordinates for the base point. For the second point, enter in (0,0).



Your shape is now centered about the origin. Type in “massprop” again to check that you did this correctly and to obtain the correct moments of inertia. Your centroid should be (0,0) and the moments of inertia will have changed.

You are done. Read off any values that you need.

11. HOW TO PLOT OR PRINT

While printing out a drawing may seem like a simple task (and often is), it can also end up being one of the most time consuming tasks when it goes wrong. For that reason, it is important to try to follow the standard procedures for printing when at all possible.

11.1 Plotting from Sheet Sets

11.1.1 Single Drawing

Steps

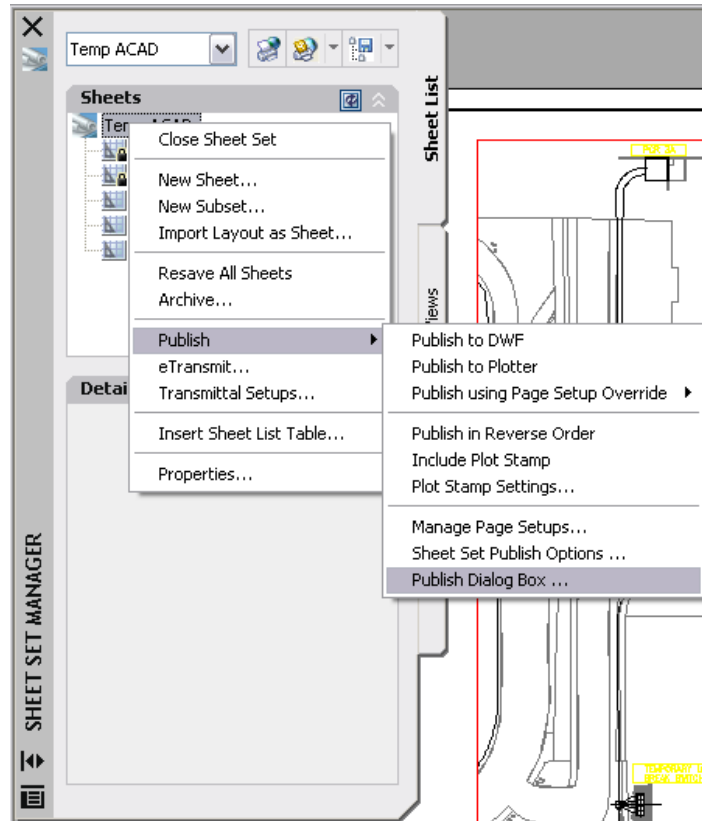
1. File > Plot...
2. If your page setup is correct you should be able to press "OK" and plot right away. However, this is more often the exception than the norm.
3. Select your plotter (Bos-Plotter-BW.pc3 or Bos-Plotter-BW2.pc3, unless printing 8.5 x 11 or 17 x 11 in which case choose whichever printer is closest to you, Watertown is closest to the co-op corral in the drafting area).
4. Plot style table should be _2005-SGH-FS.ctb for full scale or _2005-SGH-HS.ctb for half scale (unless not an SGH drawing, in which case you should use the client's pen style or the line weights may not print correctly. Sometimes the engineer or drafter on the project will need to ask the client for this .ctb file).
5. Select your desired paper size.
6. Under "What to plot:", ideally you select Window, then click Window< and type 0,0 and the coordinates of the far corner of the page (i.e. 17,11 or 48,36 etc.). However, if you click Preview and the plot does not appear correct, try changing "What to plot:" to Extents.
7. Click OK.

11.1.2 Multiple Drawings

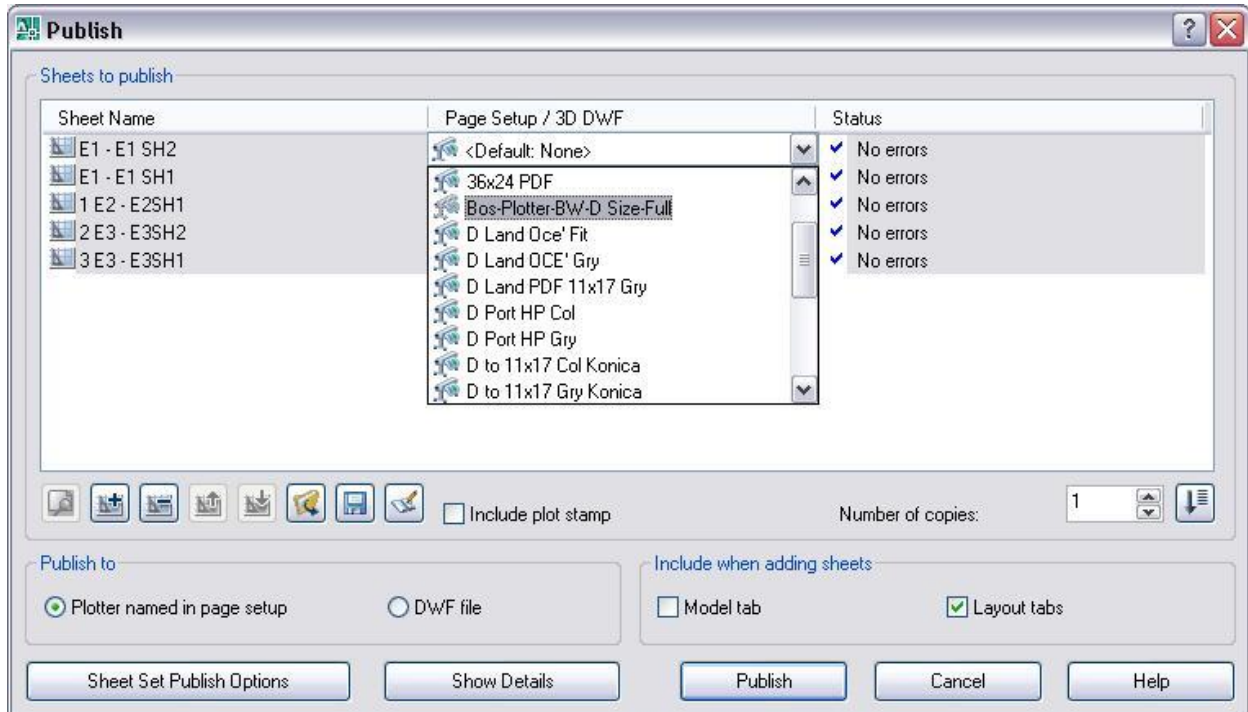
The most efficient way to print multiple drawings is by using a sheet set. If the layouts you want to print are not already a part of a sheet set, you can quickly create one (See *How to create a sheet set*).

Steps

1. Make sure all the changes you have made to your drawings are saved and open up the sheet set with the drawings you want to print.
2. If you are printing all of the layouts, right click on the name of the sheet set. If you are only printing some of the drawings use Ctrl + select to choose multiple drawings and then right click on any one of those drawings.
3. Select Publish > Publish Dialogue Box... (See Figure below)



4. Change all of the “Page Setup / 3D DWF” to desired page setup. This is most easily accomplished by highlighting all of the layouts and selecting the page setup from the drop down menu on the top item (See Figure below). You will need to have a page setup already defined with the correct settings because you cannot modify the page setups from this screen.



5. If the drawing is for internal use only, it is often helpful to check “Include plot stamp”, which will print the location of that AutoCAD on the side of the drawing.
6. Click Publish to send the drawings to the plotter.

11.2 PDF Plotting

11.2.1 Single Drawing

Engineers often need drawings plotted to PDF to send to a client, or for mark up or documentation purposes.

Steps

1. Under Page Setup, make sure the appropriate “PDF-? SIZE” from the SGH standard setups is available in the list (you do not need to set as current).
 - a. If the appropriate “PDF-? SIZE” is not there, you can either import it by clicking Import > 2006_DESI TEMPLATE - PLANS.dwt > “PDF-? SIZE” > OK, or you can create a new setup on your own.
 - b. If you want to create a custom page setup for printing to PDF’s, the plotter must be set to PostScript Level2.pc3.
2. Select File > Publish...
3. Doing this will automatically select all of the drawings in that file. If you wish to only print one, you can simply select and delete the other drawings from the list.

4. Change the “Page Setup / 3D DWF” to desired page setup. You will need to have a page setup already defined with the correct settings because you cannot modify the page setups from this screen.
5. Select Publish Options...
6. Under Location: browse to:

I:\BOS\Drafting Standards_PDF\#x#\in

Where #x# is replaced by your drawing size.

7. Select OK to return to the Publish screen and click ‘Publish’.
8. After the program runs, your drawing should appear in:

I:\BOS\Drafting Standards_PDF\#x#\out

If the PDF does not appear right away, check with Kevin Guillotte because the program actually runs remotely on his computer and he must have the software running (normally you do not have to ask).

11.2.2 Multiple Drawings

The steps for printing multiple drawings to PDF are basically a combination of plotting multiple drawings and printing a single PDF.

Steps

1. Under Page Setup, make sure the appropriate “PDF-? SIZE” from the SGH standard setups is available in the list (you do not need to set as current).
 - a. If the appropriate “PDF-? SIZE” is not there, you can either import it by clicking Import > 2006_DESI TEMPLATE - PLANS.dwt > “PDF-? SIZE” > OK, or you can create a new setup on your own.
 - b. If you want to create a custom page setup for printing to PDF’s, the plotter must be set to PostScript Level2.pc3.
2. Follow Steps 1 to 4 of “Plotting multiple drawings”.
3. Then follow Steps 5 to 8 of “Printing a single drawing to PDF”.

EXPORTING AUTOCAD DRAWINGS

1. EXPORTING INTO REVIT

It's possible that this should be in the nonexistent Revit section, but I didn't feel it was worthwhile to make a whole new section for something that kind of fits in the AutoCAD anyway.

So, someone asks you to move some details from AutoCAD to a sheet set in Revit. This is only for printing purposes – once these details are in Revit, you won't be able to edit them.

1. Make sure you don't have a title block in AutoCAD. If you do, get rid of it. The title block should be in Revit.
2. Print the drawing to PDF. Make sure it is the size you want the final sheet to be when it is printed, and that it matches the size of the title block in Revit.
3. Open the PDF in our PDF editor. Not Adobe, that Nuance PDF Converter. Save the PDF as a PNG.
4. Attempt to open Revit.
5. Go get a coffee. When you return, Revit might be open.
6. Go to the sheet you want the drawings to be a part of. Click Insert, the Image. Browse to the PNG you just made. When it inserts, it will be huge. Just drop it in the middle of the title block.
7. Now resize. You can use the little measurement tool in Revit to measure the title block, and then select the inserted image to change its size. You only need to change one dimension; the other will correct itself to match. Then snap one of the corners to the corner of the title block.

Congratulations! You have inserted an AutoCAD drawing into Revit.

2. EXPORTING INTO ABAQUS

CAD EXERCISES

1. FOUNDATION EXERCISE

1.1 Objective

Learn to use SGH layers, draw to scale text heights, and create block references and viewports.

1.2 Procedure

Open AutoCAD 2008 and create a new drawing template to work from:

- Open a new file (File > New).
- When creating a new drawing you should start with one of the standard SGH templates. These can be found under: I:\BOS\Drafting Standards_AutoCAD Shared_Templates\. You may be required to change the “file type” drop down menu to a drawing template file (.dwt). You should now see a list of templates.
- Since you are going to be drafting a foundation section with details rather than a full plan or elevation, select “Desi Template – Detail,” and open the template.
- Note: In most jobs you will work on at SGH, you will be editing or adding to existing drawings, in which case you will not have follow these steps to set up a drawing.

1.3 Paper Space Set Up

Change the paper space size of the drawing from 8-1/2 in. x 11 in. to 24 in. x 36 in:

- In the lower left-hand corner of the window, right click on the sheet “A-size-P” tab (It may also just be called Layout 1; this tab can be renamed, just like in Excel).
- Select “Page Setup Manager.”
 - The page setup determines the features of your layout. It sets the default printer (Plotter BW, Plotter-Color, or print to PDF), the size of the drawing (A through F) and whether the drawing will print to the Full size of your layout or Half the size. Selecting Full or Half size will not affect the size of your drawing in AutoCAD, only the size of paper to which it will plot.
- Select “Bos-Plotter BW-D Size Full” in the page setup list. This will set the Boston black and white plotter as the default, the paper size to D size (42 x 36 in.) and the plot setting to Full (will print to 42 x 36 in. as well).
- Click the “Set Current” button to apply your changes to your selected tab.

1.4 Model Space Set Up

- 1) We would like to end up with three details boxes at different scales: $\frac{3}{4}"=1'-0"$, $1"=1'-0"$ and $1\frac{1}{2}"=1'-0"$. To do so, create two scaled copies of the "detail box" that comes with the detail template:
 - Go back to the model space by clicking on the "model" tab. You should see a "detail box" which by default is set at $\frac{3}{4}"=1'-0"$ that is also known as "1/16 in. scale" or "scale factor of 16" (see cheat sheet for additional help: I:\BOS\Users\SKWebber\bt cheat sheet).
 - Copy and paste the original to make two new boxes.
 - Type "sc" (for scale) and select the second box (including the "detail title").
 - Select the lower left corner as the base point.
 - Type the scale factor for the scale you would like to set. For the 2nd box, this will be your $1"=1'-0"$ section; therefore, it will need a scale factor of 12. Recall that the original detail box was already in a scale factor of 16, so the value you need to type is 12/16.

Repeat the steps above with the third box but at a $1\frac{1}{2}"=1'-0"$ scale, which corresponds to a scale factor of 8.

1.5 Drawing

- 2) Create the drawing shown in Figure 1 without labeling the dimensions. Instead of creating the drawing directly in model space, create a block which can then be pasted in all three detail boxes. The advantage of creating a block is that you can change the block later and it will update all of your drawings. It is very common to go back and edit minor details in your drawing so instead of having to make the changes three times in model space, you can edit it once as a block and all of the copies will be automatically updated.
 - Type "be" (for block editor) and create a new block called "foundation."
 - Produce the foundation drawing with the dimensions shown in Figure 1. To make this task easier, you should have the SGH Tool Palettes installed (See "How to Install Tool Palettes" in the Co-op Student Manual). Using items on the SGH Tool Palettes will automatically use the correct layers. Figure 2 shows which items can come from the tool palettes.
 - The wall and footing lines should be drawn on the "DETL-SECT" layer. It is preferable to use polylines rather than normal lines because it will make the shape easier to hatch.
 - The reinforcement bars should be added on the "DETL-REIN" layer. Rebar elevations can be drawn in two ways:
 - Using $\frac{1}{2}$ in. polylines. This is the old way and should be avoided if possible.

- The preferred method is to pick it from the tool palette and modify it (Open the Tool Palette > click on Properties in the bottom-left corner > SESM > click on the Reinforcement tab > REBAR-ELEV or STD-HOOK-90). After correctly positioning your rebar, select the rebar and click on the downward arrow to select the appropriate bar width (#4 for this drawing).
 - Reinforcement cross-sections should also be added to the “DETL-REIN” layer. Rebar sections can be drawn in two ways:
 - Using 1 in. solid circle with “donut” command. This is the old way and should be avoided if possible.
 - The preferred method is to pick it from the tool palette and modify it (same as above except > REBAR – SECT (EXAGGERATED)). After correctly positioning your rebar section, select the rebar and click on the downward arrow to select the appropriate bar size (#5 for this drawing).
 - The rough connection between the wall and footing should be added using the tool palette (Tool Palette – SESM>Concrete> ROUGH – SURF).
 - The break line on the top of the wall should be added using the tool palette (Tool Palette – SESM > Annotation > BrkLine). (Scale?)
 - The concrete pattern should be added using the “hatch” command to the “PATT-CONC” layer. Use the “AR-CONC” pattern at 0.5 scale (however the scale can be adjusted until it “looks right”).
 - Do not add the leaders and the dimensions to the foundation block. You will add those in the actual model space because there will be different labels required for each drawing.
- To set the reference point for when you insert the drawing into model space, type “bparameter”, then type “b” (for base) and choose a basepoint.
 - Close the block editor and select Yes to save changes.
 - Type “i” (for insert) and insert your foundation drawing 3 times, once in each detail box. Only the check boxes for “Specify On-screen” and “uniform scale” should be checked. It is okay that the foundation block is bigger than the detail box.

1.6 Adding Dimensions

Reproduce the dimensions and text shown in Figures 3, 4 and 5. Some hints have been added to help you through this process. They can also be found in the Foundation Tutorial Final.pdf, which is in: <I:\BOS\Users\JWHuiskamp\Co-op Manual>.

- Dimensions should be added on the “ANNO-DIMS” layer and text on the “ANNO-TEXT” layer.
- It is very important to have your dimensions and text set to the correct scale, so that when the drawings are scaled in paper space the text all appears to be the same size.

- Use the standard SGH dimension styles, which should already be present on your computer under the Dimension Style Manager
 - Since the $\frac{3}{4}"=1'-0"$ scale has a scale factor of 16, the dimensions for the $\frac{3}{4}"=1'-0"$ drawing should be set to DIMS016. Similarly, DIMS012 should be used for the $1"=1'-0"$ scale and DIMS008 for the $1-\frac{1}{2}"=1'-0"$ scale. The same is also true for leaders with arrows, leaders with dots, leaders with loops and leaders with tildas, which all have their own respective styles under the Dimension Style Manager.
- Edit the “detail titles” as shown in the attached examples, by double-clicking on them.

1.7 Creating Viewports

Setup 3 viewports at the paper space of to each display one of the drawings:

- Switch back to your layout in Paper Space by clicking on the tab labeled A-size-P (or whatever you renamed it).
- Set the layer command to “Defpoints”.
- Create 3 viewports (View > Viewports > 3 Viewports > Type “v” for vertical > “0,0” for first point > “36,24” for opposite corner). This will create 3 equally sized viewports.
- Double-click on the first viewport to make it active.
- Type “z” (for zoom) and then “1/16xp” to set up the $\frac{3}{4}"=1'-0"$ scale. This scales the drawing to 1/16th of the true size of the page when plotted.
- Pan and center Detail 1 in your in the first viewport.
- Repeat the same scaling process for the other two details using “1/12xp” for the $1"=1'-0"$ scale detail and “1/8xp” for the $1-\frac{1}{2}"=1'-0"$ scale.

1.8 X-Reference Title Block

- 3) We would also like for our drawing to have a title block. The SGH title blocks are located in the SGH Tool Palettes. If you didn’t add them earlier, add them now. To install the Tool Palettes, see “How to Install Tool Palettes” in the Co-op Student Manual.
 - Title blocks are not inserted directly into the drawing, but rather xref’d in, so to create a title block for this drawing, we’ll have to create another new drawing entirely. Follow the steps above to create a new drawing, skipping step 3.
 - Go to the model space. In the SGH Tool Palettes, select the tab BOST SGH TitleBlocks. Since this is a 24in x 36in drawing, select the D-3624-sgh-bost-10-2006 title block. Insert into model space at 0,0. Although we will xref the title block into paper space of our drawing, the title block in the original file is kept in model space.
 - Title block files are saved in the Support directory. Use the file naming convention (found on the drafting cheat sheet) to the save the title block there.

- In the original title block file, you only want to fill in the title block information that is common to the entire project. Fill in the project name, project title, project address, and project number. Add the following information to the title block:
 - Project Title: Co-op AutoCAD Tutorial
 - Project Name: SGH Co-op Orientation
 - Project Address: 41 Seyon St., Waltham, MA 02453
 - Project Number: 000180.51
- Attributes that are drawing-specific, like the drawing title, date, drawn by, checked by, approved by, scale, drawing status, drawing number, scale, etc., should be in drawing files itself. Where there are placeholders for this information in the title block, delete. Make sure there is nothing else in the model space of this drawing (because it will show up in the xref as well). Now save the file, and close.
- In your drawing file, go to the paper space. In the external references palette, click Attach Drawing (upper left-hand corner). Navigate to and select your title block file. Leave the reference type as attachment and select Relative Path for the Path Type. Click OK. Insert at 0,0.
- Now we need to add our drawing-specific information to the title block. Go to the BOST SGH Title Blocks tab on the Tool Palette again, and select the Drawing Title-Text-D under Drawing Sheet Title Text Blocks. Insert at 0,0.
- Add the following information to the title block:
 - Drawing Number: S1.0
 - Drawing Title: Foundation Sections
 - Date: the date
 - Drawn By: your initials
 - Scale: We used different scales for each detail, so put 'As Noted'

1.9 Align Details

Align details for proper presentation:

- In paper space, draw a line aligned with the bottom of the first detail box all the way to the third detail.
- Pan in the other two viewports so that the detail boxes are aligned with that line in paper space. Then delete the line in paper space.

1.10 Print Drawing

Print to BOS-Plotter-BW.pc3, 24x36, plot style table 2005sgh.cbt (should have these settings by default).

See Scott Webber if this is not working for you. Final output should appear similar to the Foundation Tutorial Final.pdf.

REFERENCES

This tutorial was done using information from the following documents and Authors.