

F

Drawing a Foundation or Basement Plan

In this chapter, you will learn the following to World Class standards:

- **Draw a Foundation or Basement Plan**
- **Draw the Basement Walls**
- **Draw the Pilasters on Both Sides of the Basement Wall**
- **Draw the I-beam, Support Columns and Pad in the Basement Plan**
- **Draw the Basement Windows**
- **Draw the Basement Stairs**
- **Dimension the Basement Plan**

Draw a Basement or Foundation Plan

In this project, we will learn how to draw a basement or foundation plan. We will continue to use the Multiline command to construct the foundation walls and the footer. We will show the I-beam, pilasters, support columns, stairs, and windows. We will dimension the basement plan so a construction company has the necessary information to build the basement.

We will start the session with a sketch that has the required dimensions to create the lines in our CAD drawing. We will be using AutoCAD 2011 in this example.

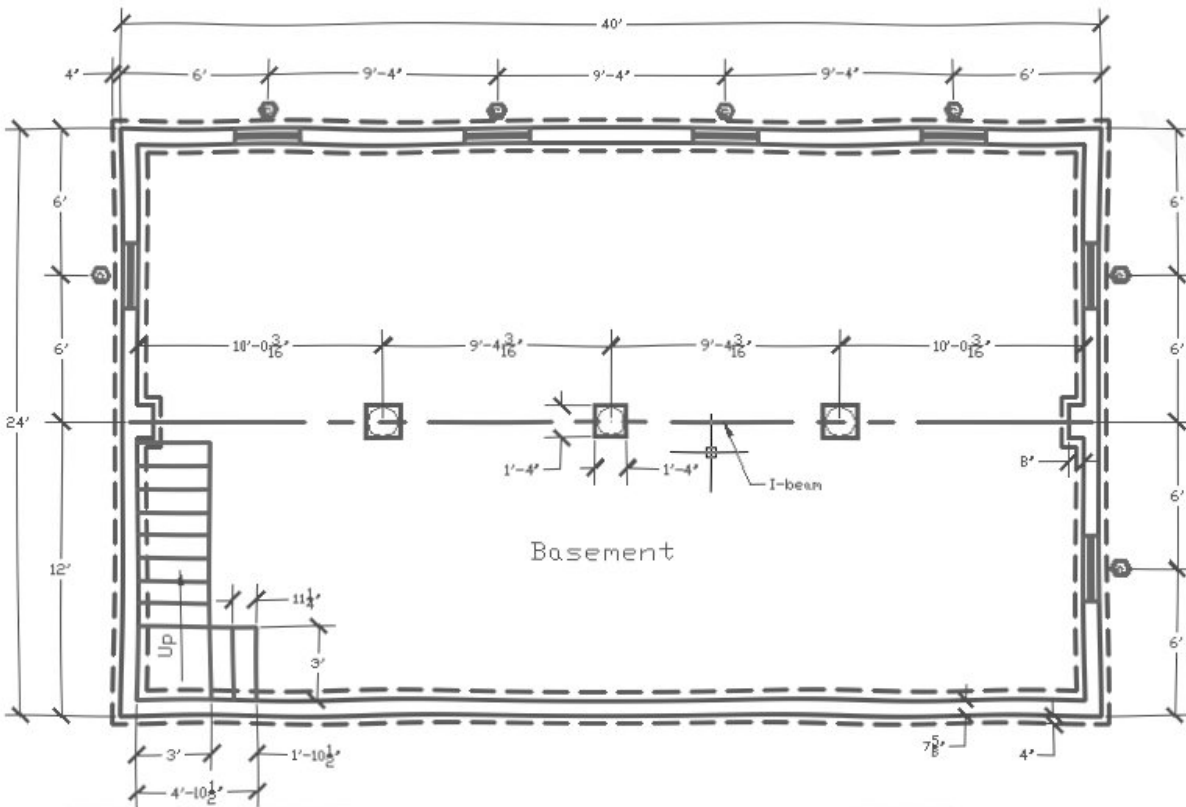


Figure F.1 – Sketch of the Basement

Draw the Basement Walls

The outside of our basement wall measures 40' by 24'. Before we begin our CAD project, we will want to open the Architectural.dwt template and create the “8 inch block foundation wall” multiline. The steps to generate the multiline are shown in Appendix E.

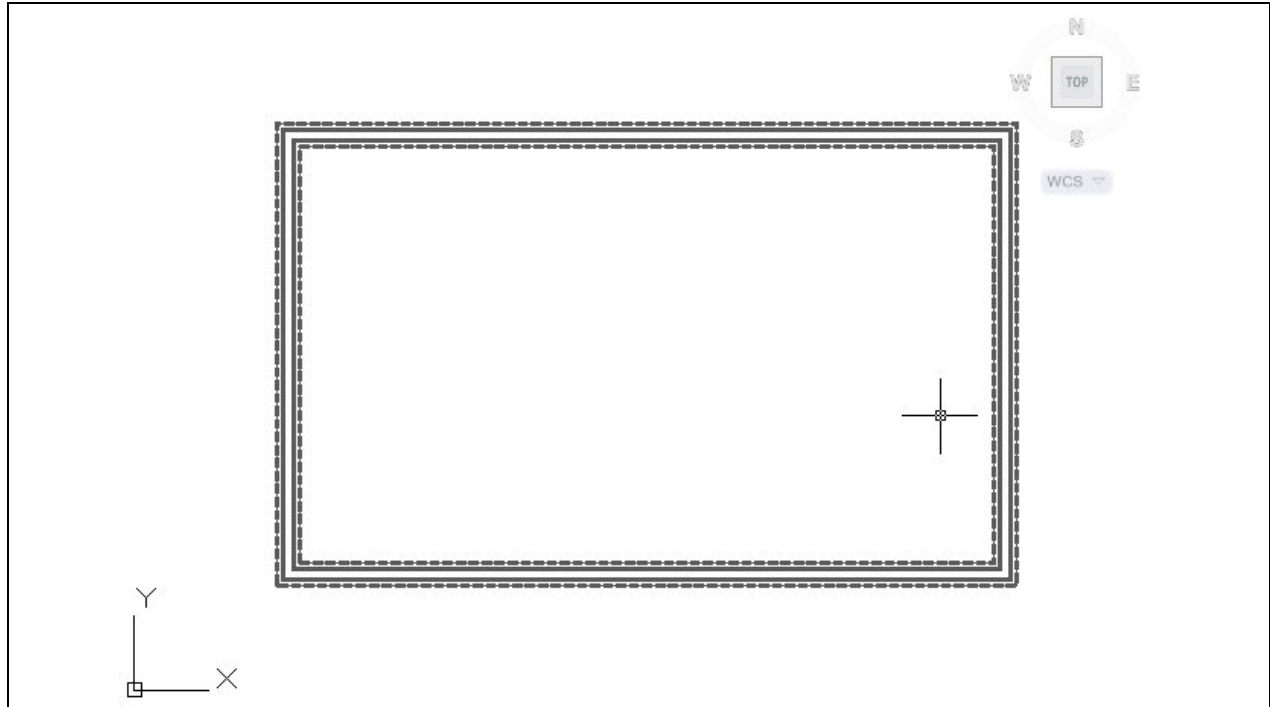


Figure F.5 – A 40' x 24' Foundation

Draw the Pilasters on Both Sides of the Basement Wall

The next feature we will add in the basement plan is the pilaster. This element gives extra mass to the portion of the wall where the I-beam will rest. There is a pilaster on both sides of the basement wall and they are 180 degrees apart.

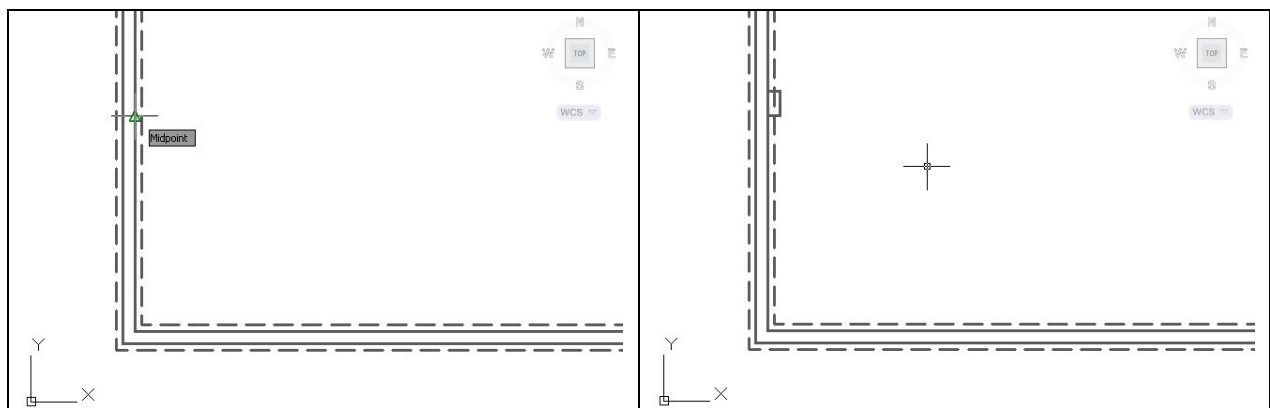


Figure F.6 – Starting at the Midpoint

Figure F.7 – Adding a 8" by 16" Pilaster

We should still be on the foundation layer. We begin to make the pilaster detail by drawing an 8-inch Polyline to the right, horizontally from the midpoint of the inside of the west wall. Then we draw another segment 16 inches upward and the last section 8 inches to the left.

We then move the Polyline eight inches down to center the pilaster in the middle of the wall as shown in Figure F.8. The footer below the 8-inch concrete block extrudes around the pilaster outcropping, so we will offset the pilaster 4 inches to the right.

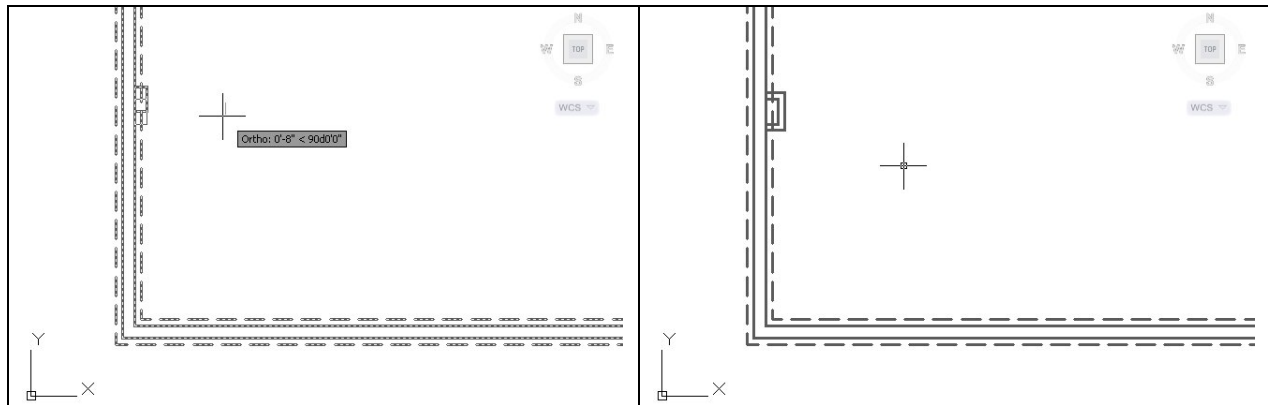


Figure F.8 – Center the 8” by 16” Pilaster **Figure F.9 – Offset 4” for the Footer**

The foundation layer has the continuous linetype, but we show the footer with a hidden linetype. To change the Polyline segment that represents the footer, select the entity that was just offset and then choose the Hidden linetype from the linetype Listbox on the Properties toolbar as shown in figure F.10.

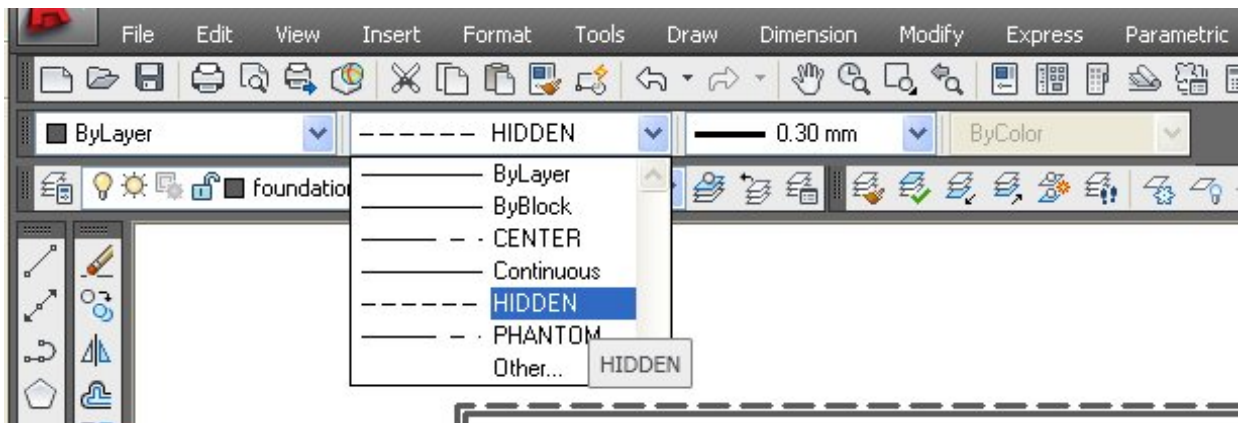


Figure F.10 – Linetype Listbox on the Properties Toolbar

As shown in figure F.10, the lines representing the footer around the pilaster will become hidden on the foundation layer.

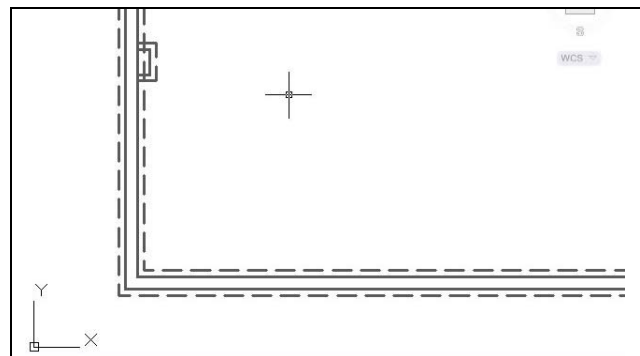


Figure F.11 – Change the Footer Linetype

Next, we will copy the pilaster feature to the other side of the basement wall by using the Mirror command. We select both the pilaster and footer entities and we press the Enter key. Then we pick the midpoint of the basement wall and with the Ortho mode on, we pick another point anywhere below the first selection. Another two entities will appear on the opposite wall.

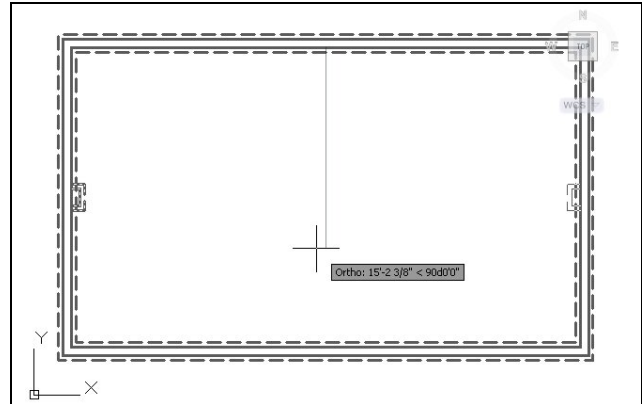


Figure F.12 – Mirror the Pilaster

The final step in completing the pilaster and footer detail is to trim the wall and footer multiline to make the drawing appear as shown in the figure F.13. We will explode the multiline so we can use the Trim command.

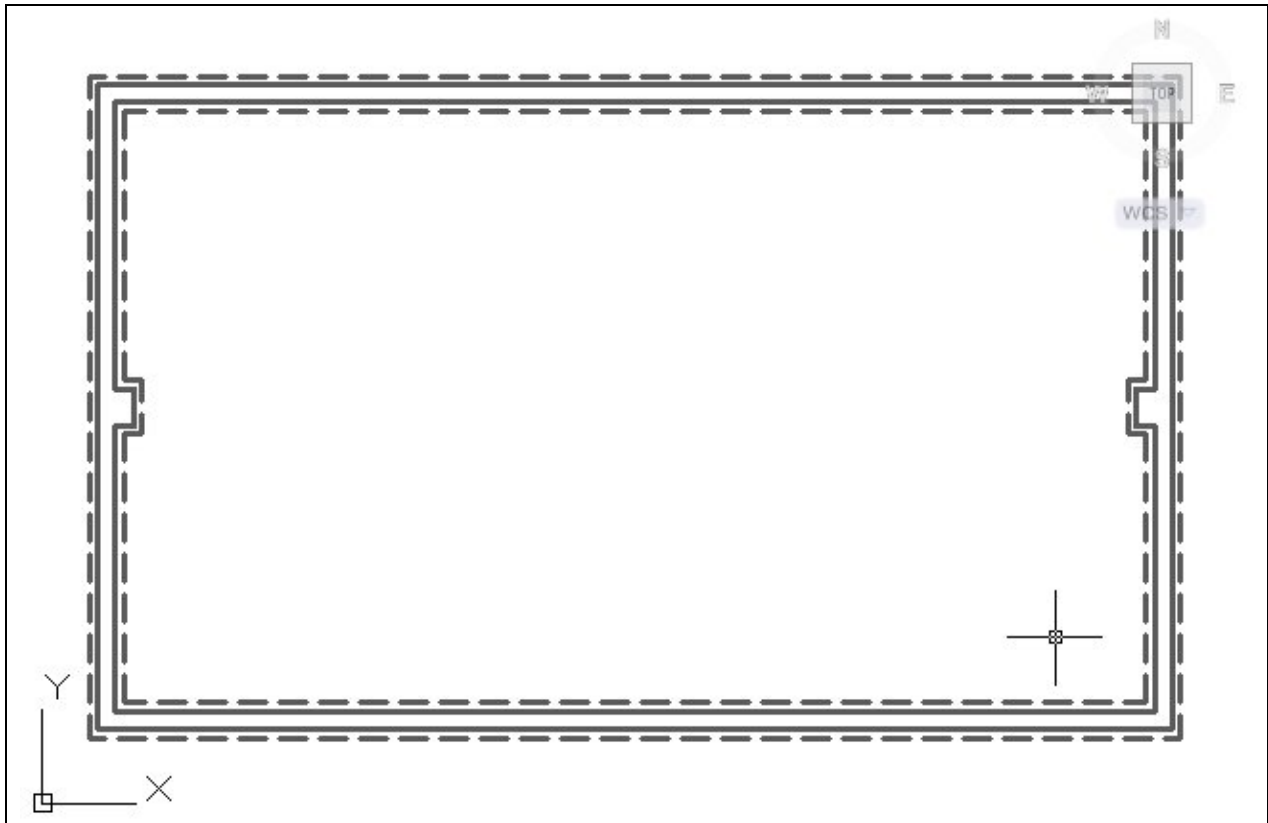


Figure F.13 – Trim the Pilasters

Draw the I-beam, Support Columns and Pad in the Basement Plan

The next feature we will add to the basement plan is the I-beam that supports the load of the upper floors and roof. If our residential home was narrow enough or the floor and roof trusses were strong enough to bear the load, The designer would not need a center beam. However, many home designers use an I-beam to support the load at the middle of the structure. Therefore, the CAD drafter needs to know how to represent the beam.

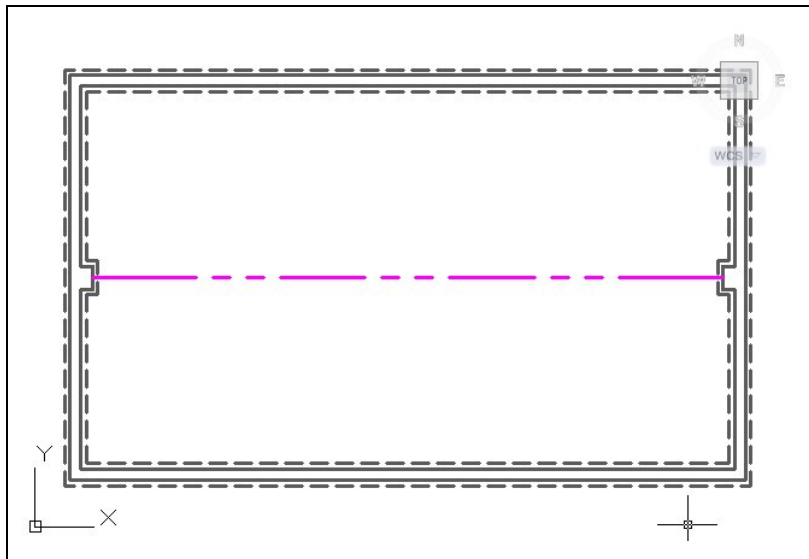


Figure F.14 – Draw the I-beam

Next, we see that three columns support the beam, which means that we want to divide the line into four segments. We can use the Divide command to give us three points that show the positions of each partition. We type Divide at the command line and select the line representing the I-beam. We type 4 and Enter.

Command: divide
Select object to divide:
Enter the number of segments or [Block]: 4

We cannot see the points on the I-beam, so we choose Format on the Menu Bar and select Point Style from the popup menu. We will choose a circle to represent the column and push the OK command button.

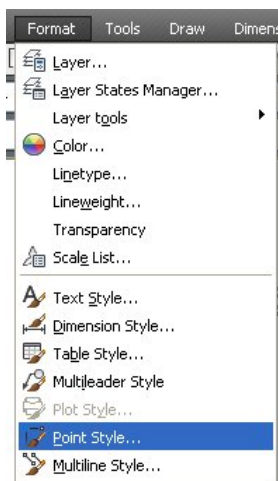


Figure F.15 – Point Style

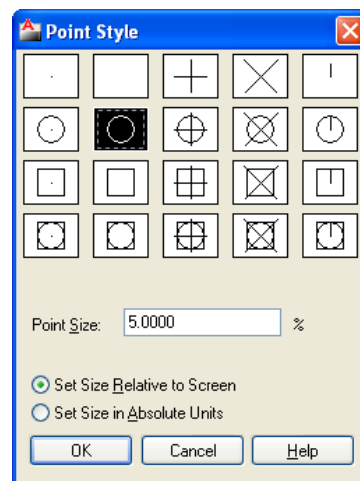


Figure F.16 – Point Style Window

The three points shown as circles divide the I-beam into four equal segments.

The columns like the wall and pilasters need to rest on a solid foundation. The construction company will pour concrete pads for the columns to rest upon.

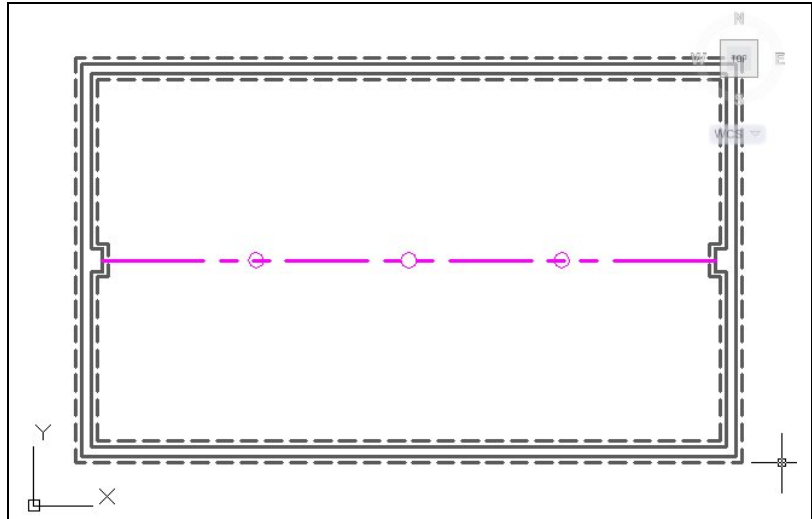


Figure F.17 – The Location of the Support Columns

We need to change the current layer back to foundation. At the left point on the beam, we will start a new Polyline using the Node Object Snap. Then we draw a line segments, 8-inches to the right, 16 inches upward, 16 inches to the left, 16 inches downward and then we close the Polyline.

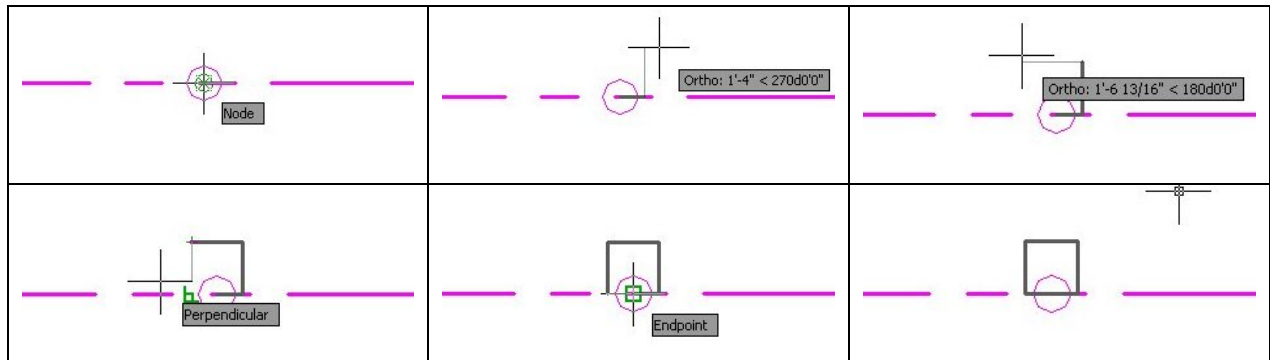


Figure F.18 – Draw the Pad for the Column

We then move the support pad 8 inches downward using the Move command. Now the pad is centered under the column.

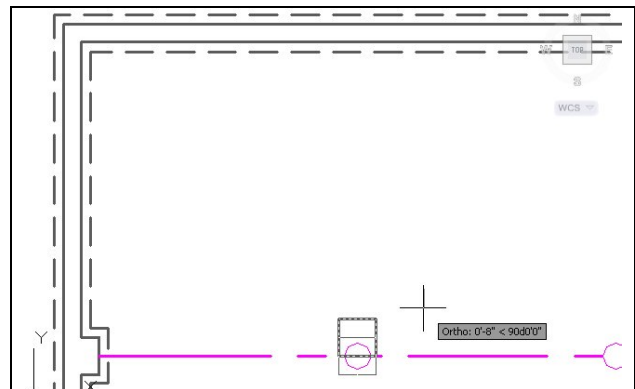


Figure F.19 – Center the Support Pad

While we still are using the Node object snap, we will copy the support pad from node to node as shown in the figure F.20.

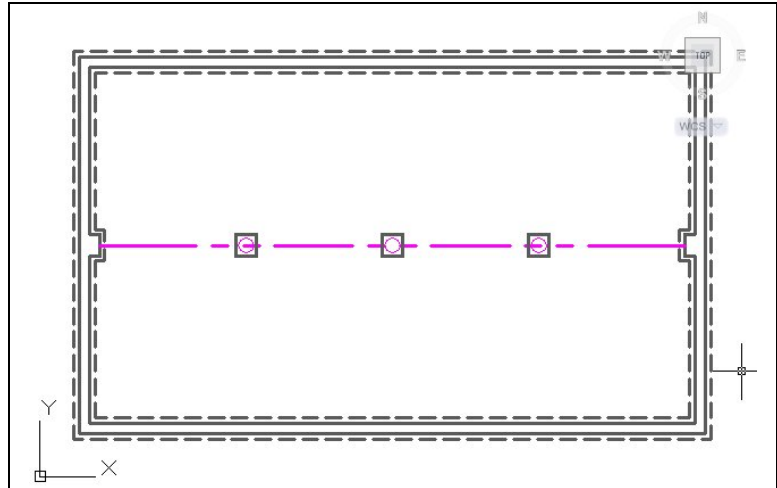


Figure F.20 – Draw the Pad for the Column

The I-beam needs to set on the pilaster and block wall, so we will extend the line representing the I-beam. We do this by selecting the line and we can see the three grips on the line. Place the cursor in the left grip and with the Ortho mode on, we move the line to the left. Type 12 and the line will extend 12 inches to the left.

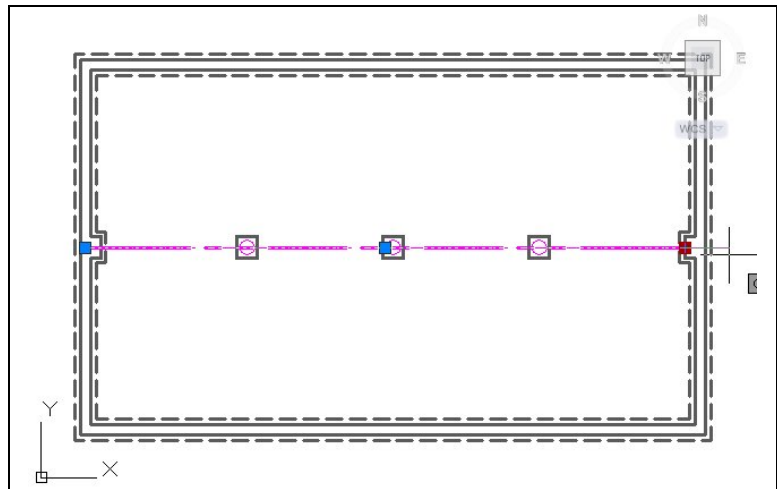


Figure F.21 – Extend the I-beam

Again, the I-beam needs to set on the pilaster and block wall on the right side. While the line representing the I-beam is still highlighted, we place the cursor in the right grip and with the Ortho mode on; we move the line to the right. Type 12 and the line will extend 12 inches to the right. The line is now the precise length of the I-beam.

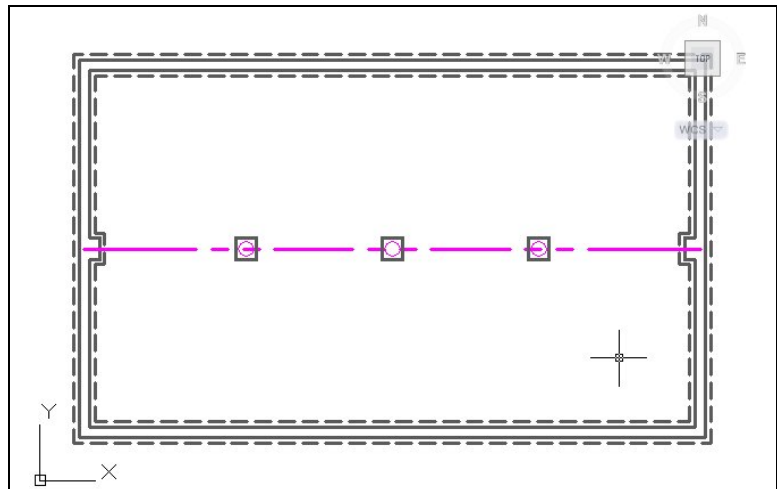


Figure F.22 – The Finished I-beam

Draw the Basement Windows

The next feature in the basement plan is the window. Unlike the windows on the first and second floors, this window will fit into an opening where we remove the concrete blocks. That means we should make our basement windows in 8-inch increments. We begin by changing the current layer to window. We will draw a 32-inch long line from the upper left corner as shown.

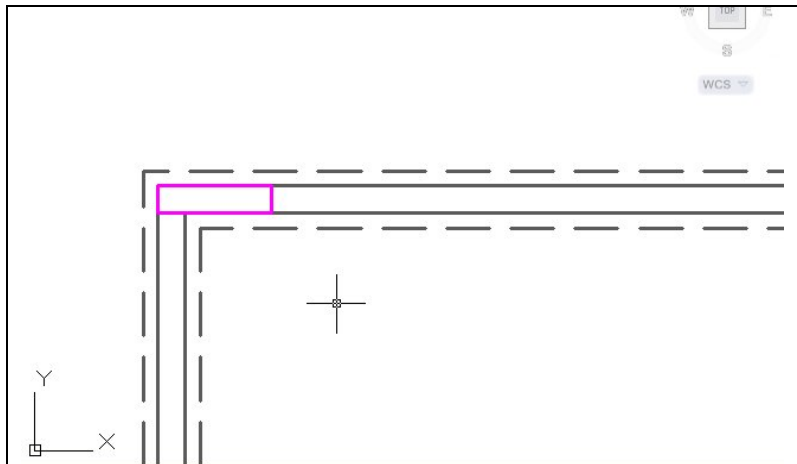


Figure F.23 – Draw the Window Box in the Corner

We continue by drawing another line 8 inches downward. The next line will return 32 inches and then we will close the window box. We move the window 56 inches to the right as shown.

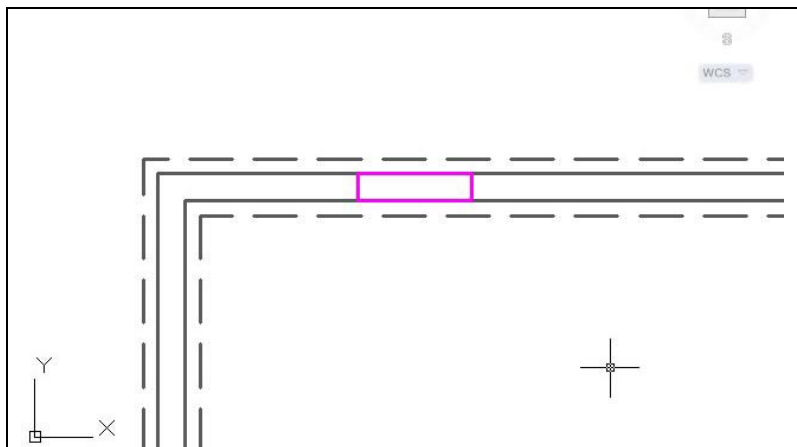


Figure F.24 – Move the Window Box

We will use the Offset command to copy the horizontal lines of the window 3 inches inward as shown.

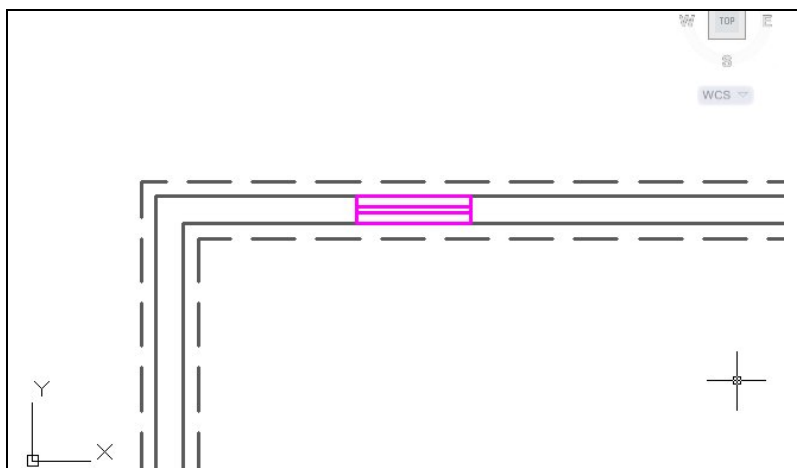


Figure F.25 – Draw the Window Glazing

When we show a window on the basement plan, we use a letter inside a hexagon to denote the type of window and we can match the description of the window by reading the same letter on the window schedule in the plan set.

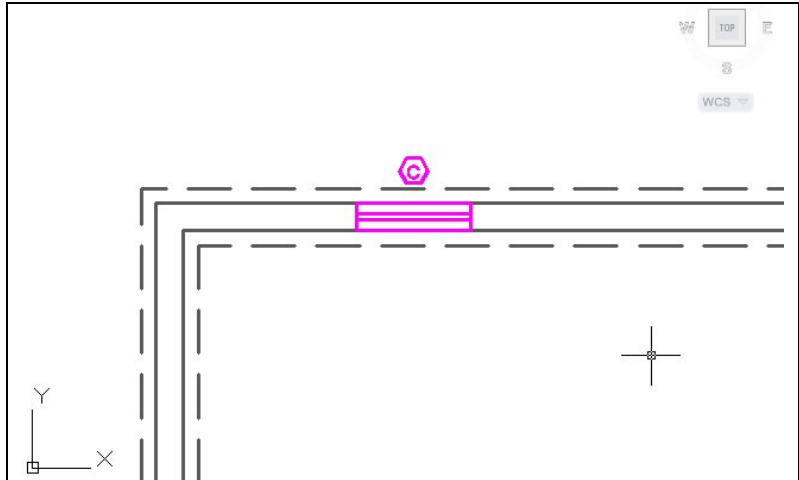


Figure F.26 – Add the Window Symbol

According to the sketch, we add the letter C at the midpoint of the outside line representing the window using Dtext and Middle for the text insertion point. We draw a hexagon at the same midpoint that has a radius of 4". We move the letter and hexagon 9 inches upward. We change the current layer to dimension and place the measurement as shown in figure F.27.

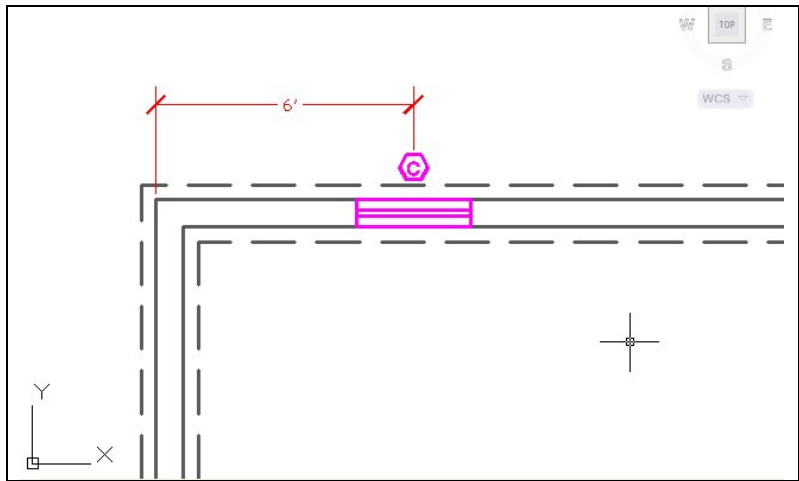


Figure F.27 – Dimension the Basement Window

We copy the window and symbol three times, so that we have four windows on the top side of the basement plan. We place dimensions from the center of each window to the next window and from the center of the end windows to the outside corner of the basement wall.

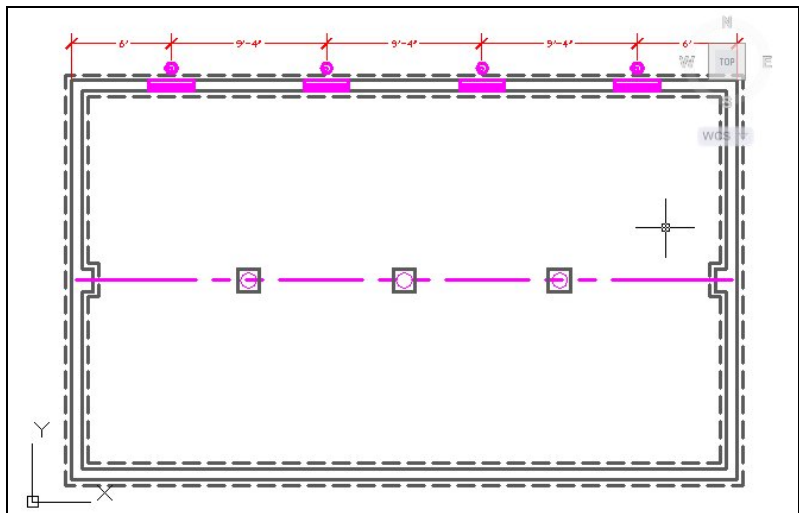


Figure F.28 – Copy the Basement Window

We need two windows on the right side of the basement plan, We repeat the process of making the window box, and we copy the window symbol to the midpoint of the window line. We move the window symbol 7 inches to the right and then we place a dimension from the upper right corner of the basement to the center of the window.

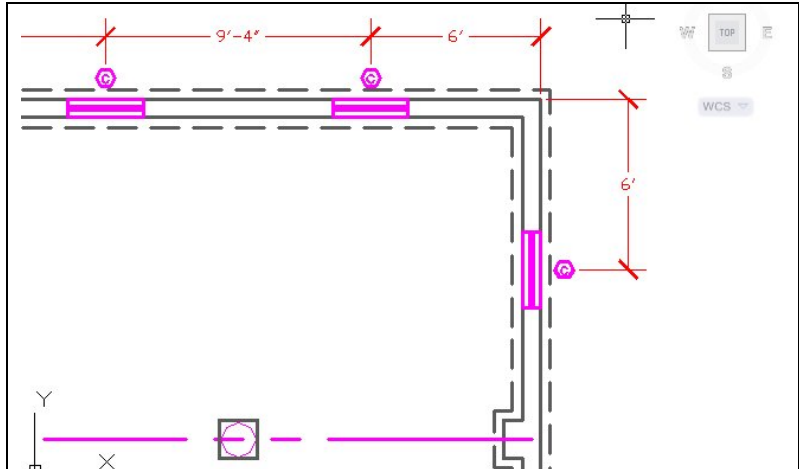


Figure F.29 – Draw the East Basement Window

There is another window on the same wall length and on the opposite side of the I-beam. We can mirror the window box and place the dimensions as shown.

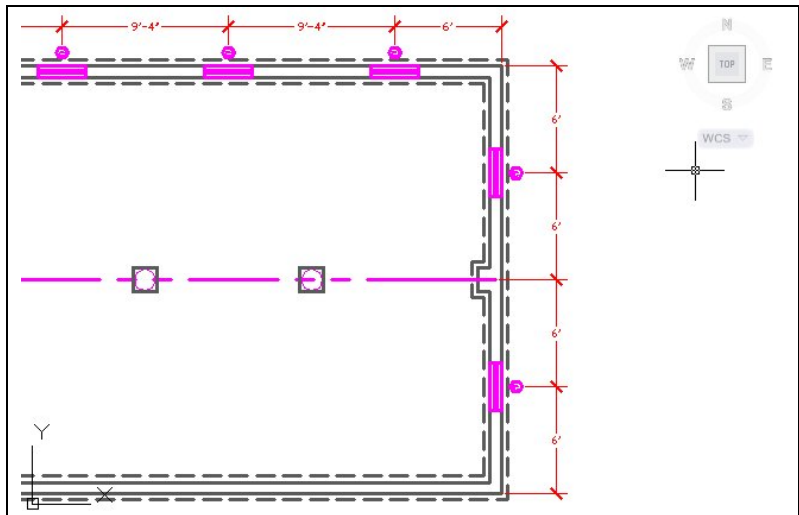


Figure F.30 – Draw the Next East Window

We need one window on the left side of the basement plan, We can mirror the window box from the right side using the midpoint of the I-beam line as the mirror line. We can copy the window symbol and place it on the center of the window box. We move the window symbol 7 inches to the left and then we place a dimension from the upper left corner of the basement to the center of the window.

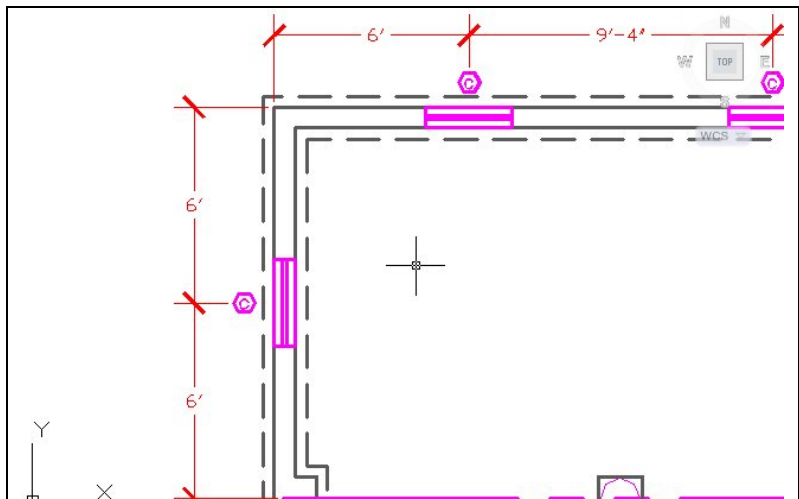


Figure F.31 – Draw the West Window

Draw the Basement Stairs

The last feature in the basement plan is the stairs. Our basement stairs goes down 9 steps to a landing, and then we turn 90 degrees and take three more steps. We first change the current layer to stairs. In the inside lower right corner of the basement plan, we draw a 3-foot square box as shown.

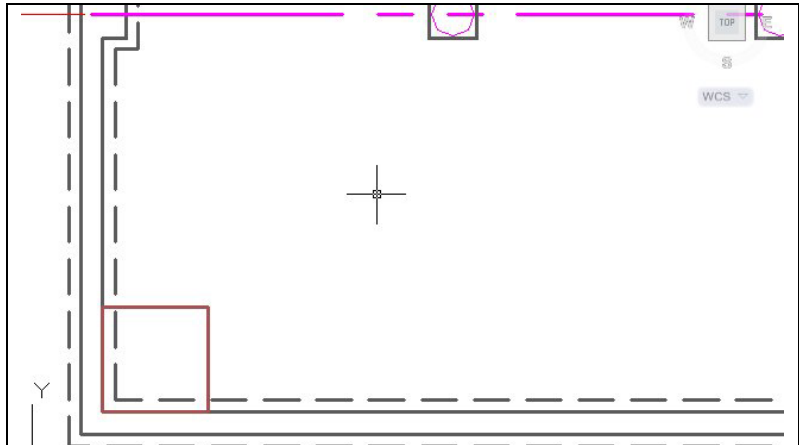


Figure F.32 – Draw the Landing of the Stairs

We will use a 2 x 12 wood board to make the basement steps, which actually measures 1.5” by 11.25”. We will use the Offset command to copy the steps from the landing 11.25 inches apart. We will copy two lines to the right and eight lines to the top.

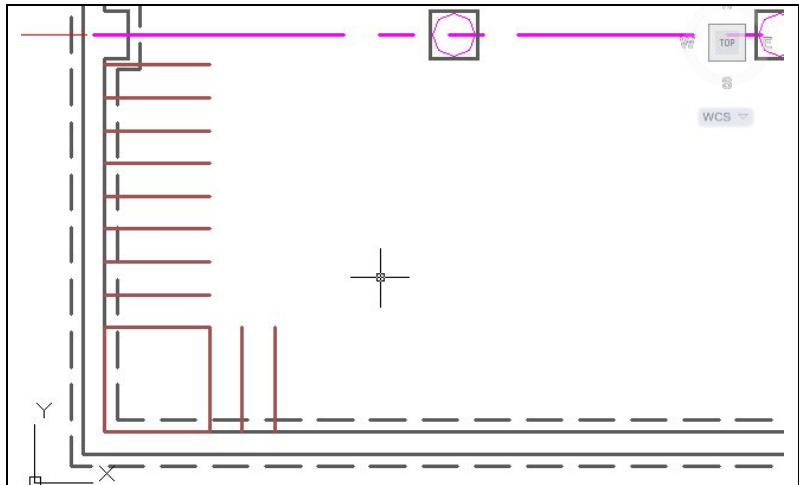


Figure F.33 – Offset the Steps

We finish the stairs by drawing two lines to show the outline of the stair steps as shown in figure F.33.

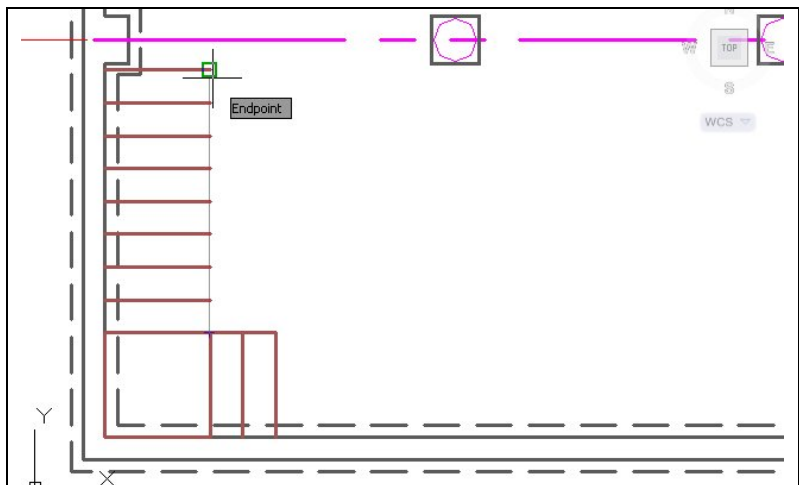


Figure F.33 – Add a Two Lines

We should place dimensions the stairs as shown in figure F.34. We show the distance between steps and the outside measurements of the stair as seen from above.

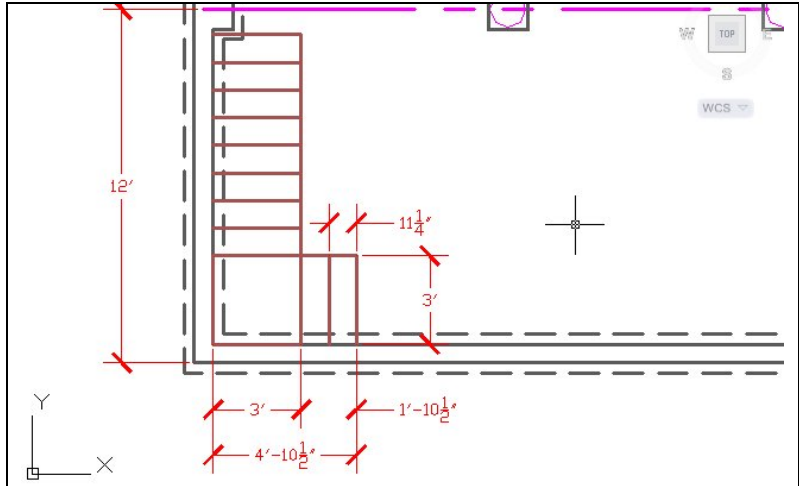


Figure F.34 – Dimension the Stairs

Dimension the Basement Plan

When we dimension the finished basement plan, we utilize the sketch to account for every measurement shown by the home designer. We can use a highlighter as we place the linear dimension on the plan.

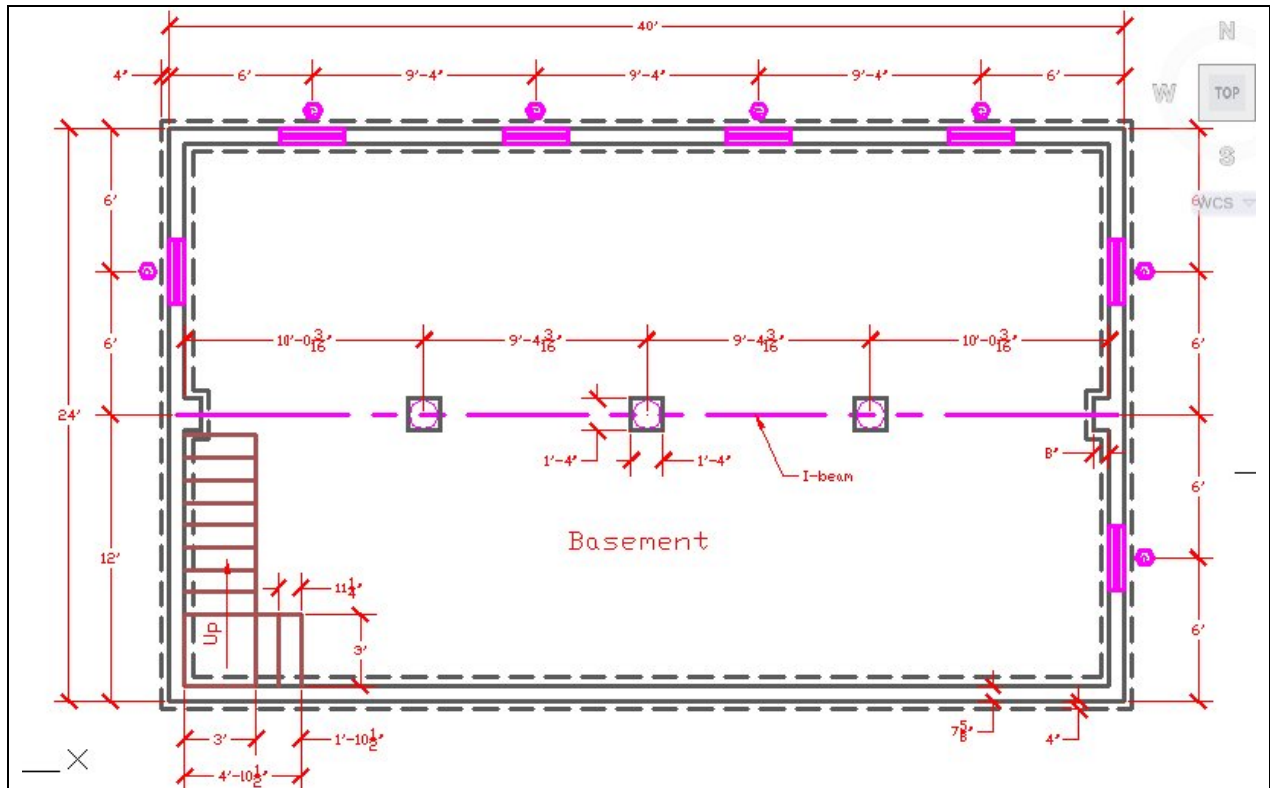


Figure F.35 – Dimension the Basement

*** World Class CAD Challenge * - Open a new file in your CAD program with the architectural template. Draw the basement wall using the multiline. Draw the two pilasters, I-beam, support beams, pads, windows, and stairs showing dimensions in 30 minutes.**

Continue this drill multiple times using the steps we have learned, each time completing the drawing under 30 minutes to maintain your World Class ranking