ELISE MOSS
Autodesk Certified Instructor

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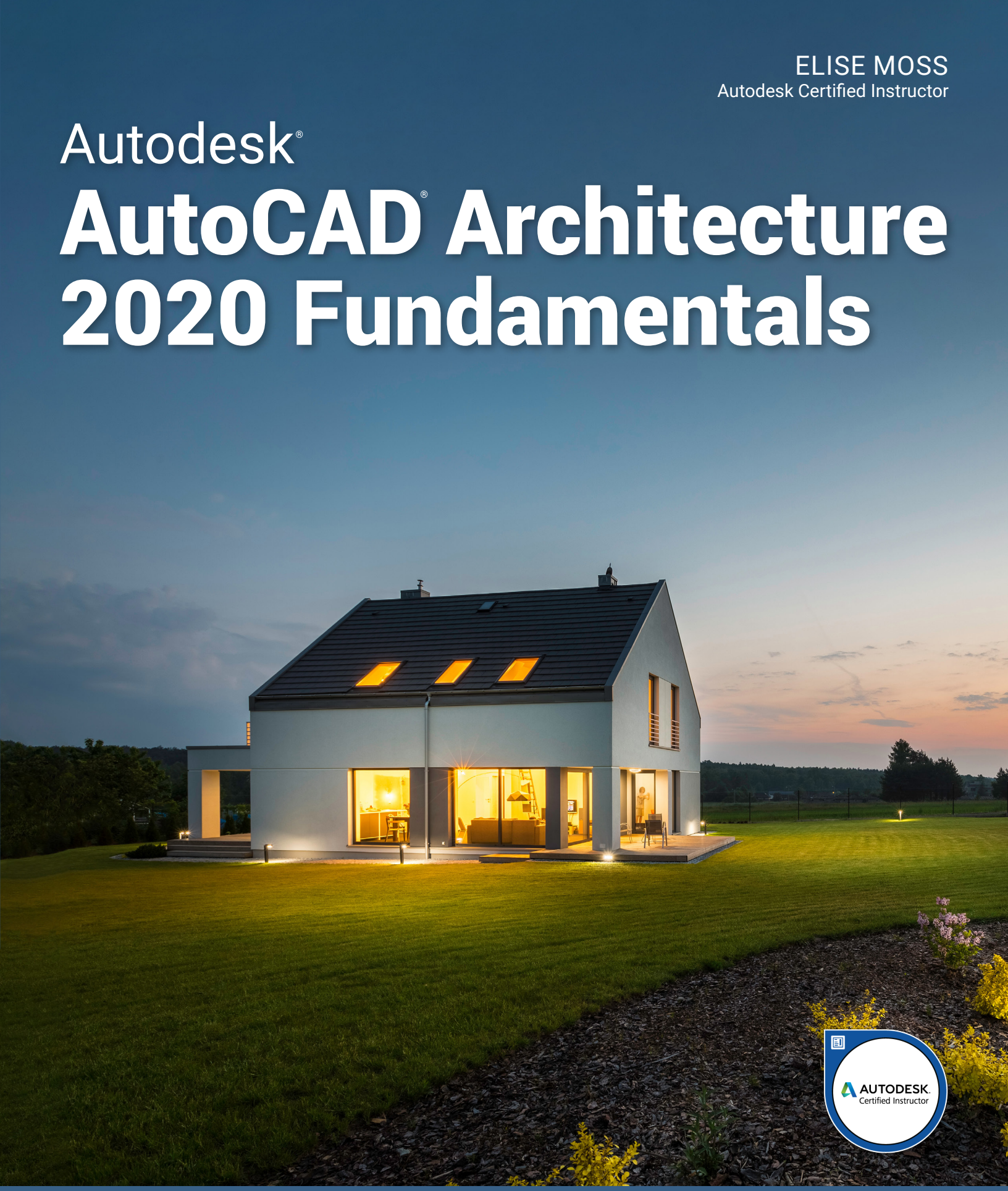
AutoCAD® Architecture 2020 Fundamentals



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Lesson 3:
Floor Plans

AutoCAD Architecture comes with 3D content that you use to create your building model and to annotate your views. In ACA 2020, you may have difficult locating and loading the various content, so this exercise is to help you set up ACA so you can move forward with your design.

The Content Browser lets you store, share, and exchange AutoCAD Architecture content, tools, and tool palettes. The Content Browser runs independently of the software, allowing you to exchange tools and tool palettes with other Autodesk applications.

The Content Browser is a library of tool catalogs containing tools, tool palettes, and tool packages. You can publish catalogs so that multiple users have access to standard tools for projects.

ACA comes with several tool catalogs. When you install ACA, you enable which catalogs you want installed with the software. By default, Imperial, Metric, and Global are enabled. The content is located in the path: C:\ProgramData\Autodesk\ACA 2020\enu\Tool Catalogs.

The floor plan is central to any architectural drawing. In the first exercise, we convert an AutoCAD 2D floor plan to 3D. In the remaining exercises, we work in 3D.

A floor plan is a scaled diagram of a room or building viewed from above. The floor plan may depict an entire building, one floor of a building, or a single room. It may also include measurements, furniture, appliances, or anything else necessary to the purpose of the plan.

Floor plans are useful to help design furniture layout, wiring systems, and much more. They're also a valuable tool for real estate agents and leasing companies in helping sell or rent out a space.

Exercise 3-1:

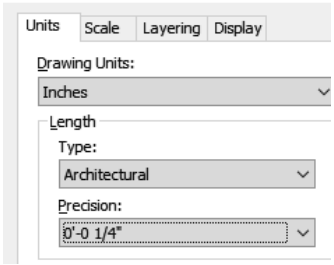
Going from a 2D to 3D Floor plan

Drawing Name: New
Estimated Time: 45 minutes

This exercise reinforces the following skills:

- Create Walls
- Wall Properties
- Wall Styles
- Style Manager
- Insert an AutoCAD drawing
- Trim, Fillet, Extend Walls

1. Start a new drawing using QNEW or select the + tab.

2. 

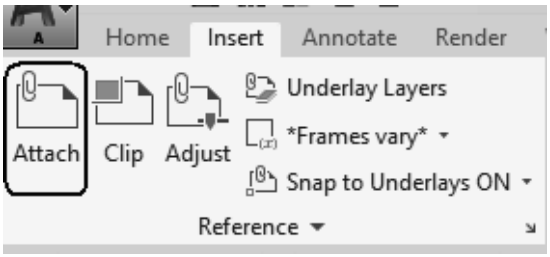
Type **UNITS**.

Set the Units to **Inches**.

Set the Type to **Architectural.**

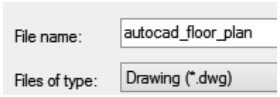
Set the Precision to **¼"**.

Press **OK**.

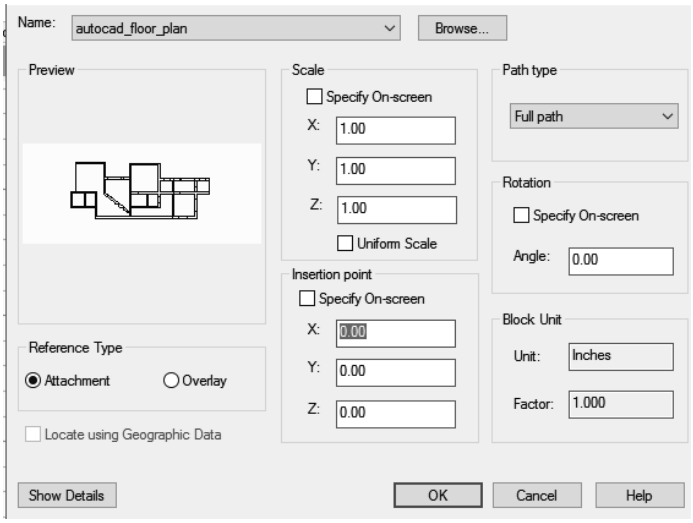
3. 

Activate the **Insert** ribbon.

Select **Attach**.

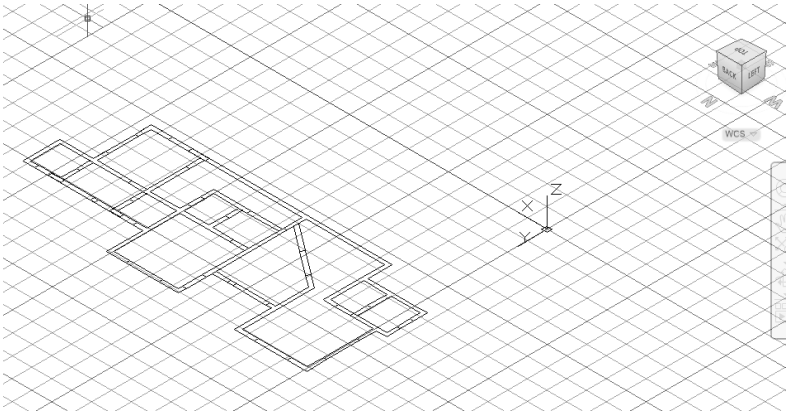
4. 

Locate the *autocad_floor_plan.dwg* file in the exercises.
Set your Files of type to Drawing (.dwg) to locate the file.*
Press **Open**.

5. 

Uncheck Insertion Point.
Uncheck Scale.
Uncheck Rotation.
This sets everything to the default values.

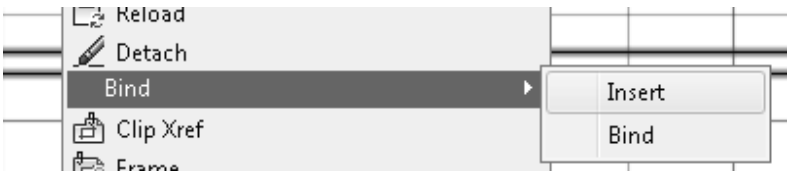
Press **OK**.

6. 

Use the ViewCube to switch to a 3D view.

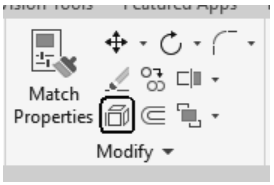
Note that the AutoCAD file is 2D only.

Return to a top view.

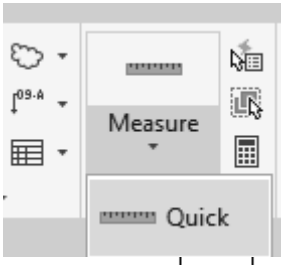
7. 

Select the attached xref.
Right click and select **Bind→Insert**.
This converts the xref to an inserted block.

8. Select the block reference and type **EXPLODE** to convert to lines.



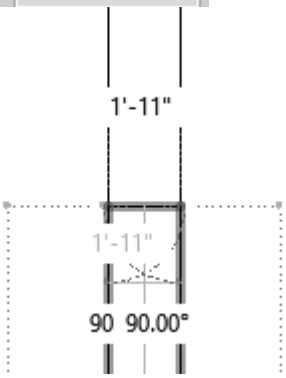
You can also use the Explode tool on the Modify panel of the Home ribbon.

9. 

Activate the **Home** ribbon.

Select the **Quick** measure tool from the Utilities panel.

This tool is new in 2020.

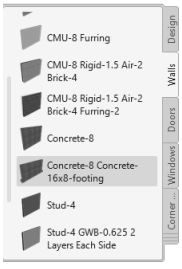
10. 

Hover the cursor over a wall.

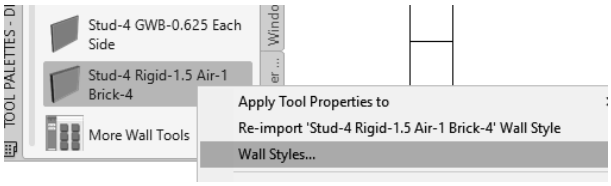
Note that the walls are 1′-11″ thick.

11. 

Launch the **Design Tools** palette from the Home ribbon.

12. 

Activate the **Walls** palette.

13. 

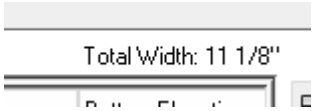
Right click on the **Stud-4 Rigid-1.5 Air-1 Brick-4** wall style and select **Wall Styles**.

This launches the Style Manager.

14. 

Note that the only wall styles available are Standard and the style that was just imported.

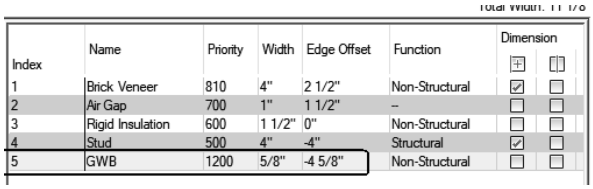
Highlight the **Stud-4 Rigid-1.5 Air-1 Brick-4** wall style.

15. 

Activate the **Components** tab.

The components tab lists the materials used in the wall construction.

Note the components listed in the Style Manager for the wall style. The total wall thickness is 11-1/8″. We need a wall style that is 1′–11″. We need to add 11- 7/8” of material to the wall style.

16. 

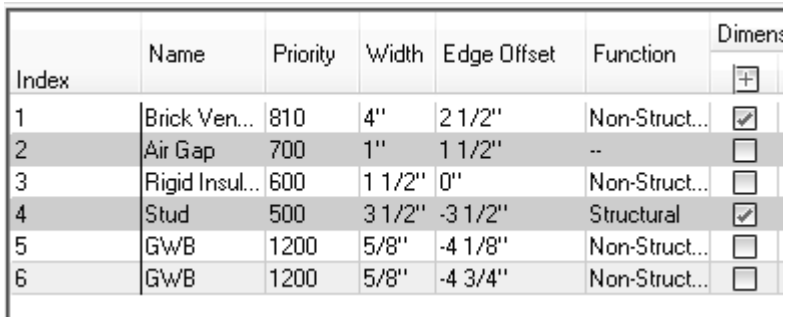
Index	Name	Priority	Width	Edge Offset	Function	Dimension
1	Brick Veneer	810	4"	2 1/2"	Non-Structural	☑ ☐
2	Air Gap	700	1"	1 1/2"	--	☐ ☐
3	Rigid Insulation	600	1 1/2"	0"	Non-Structural	☐ ☐
4	Stud	500	4"	-4"	Structural	☑ ☐
5	GWB	1200	5/8"	-4 5/8"	Non-Structural	☐ ☐

Highlight the row that lists the GWB material.

GWB stands for Gypsum Wallboard.

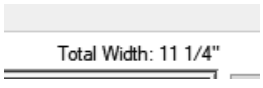
17. 

Select the **Add Component** tool.

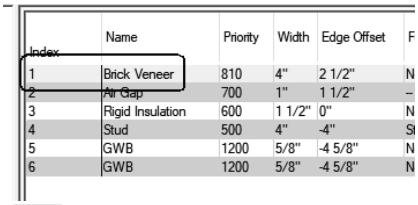
18. 

Index	Name	Priority	Width	Edge Offset	Function	Dimens
1	Brick Ven...	810	4"	2 1/2"	Non-Struct...	☑
2	Air Gap	700	1"	1 1/2"	--	☐
3	Rigid Insul...	600	1 1/2"	0"	Non-Struct...	☐
4	Stud	500	3 1/2"	-3 1/2"	Structural	☑
5	GWB	1200	5/8"	-4 1/8"	Non-Struct...	☐
6	GWB	1200	5/8"	-4 3/4"	Non-Struct...	☐

Another 5/8″ piece of GWB (gypsum board) is added.

19. 

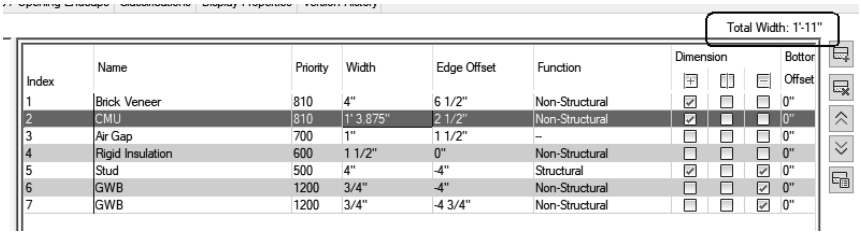
Note that the thickness of the wall updated to **11 ¼”.**

20. 

Index	Name	Priority	Width	Edge Offset	F
1	Brick Veneer	810	4"	2 1/2"	N
2	Air Gap	700	1"	1 1/2"	–
3	Rigid Insulation	600	1 1/2"	0"	N
4	Stud	500	4"	-4"	St
5	GWB	1200	5/8"	-4 5/8"	N
6	GWB	1200	5/8"	-4 5/8"	N

Highlight the Brick Veneer material in the top row.

21.  Select the **Add Component** tool.

22. 

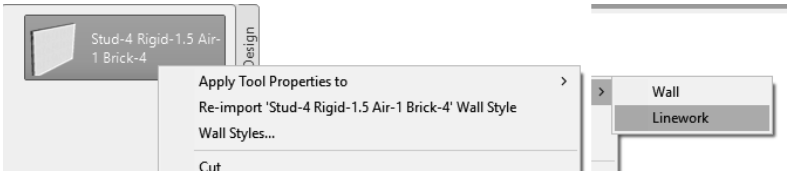
Total Width: 1'-11"

Index	Name	Priority	Width	Edge Offset	Function	Dimension	Bottor Offset
1	Brick Veneer	810	4"	6 1/2"	Non-Structural	☑ ☐ ☐	0"
2	CMU	810	1' 3.875"	2 1/2"	Non-Structural	☑ ☐ ☐	0"
3	Air Gap	700	1"	1 1/2"	–	☐ ☐ ☐	0"
4	Rigid Insulation	600	1 1/2"	0"	Non-Structural	☐ ☐ ☐	0"
5	Stud	500	4"	-4"	Structural	☑ ☐ ☑	0"
6	GWB	1200	3/4"	-4"	Non-Structural	☐ ☐ ☑	0"
7	GWB	1200	3/4"	-4 3/4"	Non-Structural	☐ ☐ ☑	0"

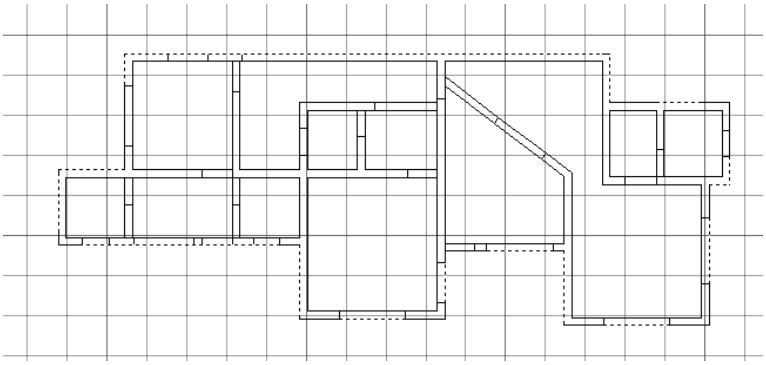
To change the values, just place the cursor in that cell and start typing.

Change the name of the second row material to **CMU**.
Set the width to 1’ 3.875” thick.

23. Verify that your layers are set as shown.
    Verify that the total width is 1’ 11”.
24. Press **OK** to close the Styles Manager dialog.

25. 

Right click on the **Stud-4 Rigid-1.5 Air-1 Brick-4** wall style and select **Apply Tool Properties to → Linework**.

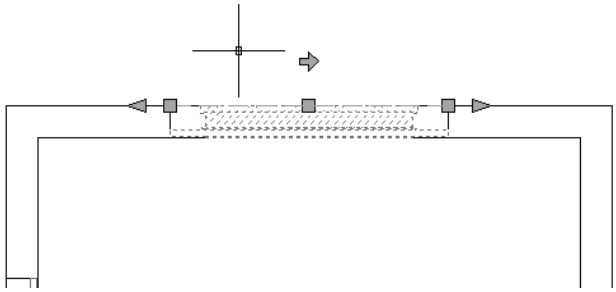
26. 

Select the outside segments of the walls.

Do not select any of the interior walls.

Press ENTER when you are done selecting lines.

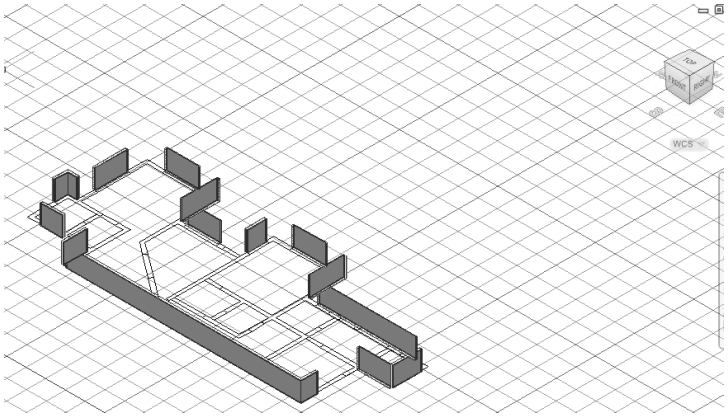
27. You will be prompted if you want to erase any of the linework. Enter **NO**.

28. 

Zoom into one of the walls that was placed.

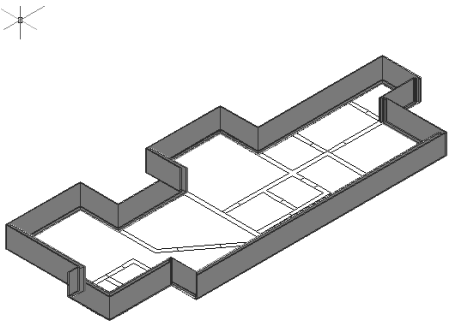
Note that it is the correct width. The blue arrow indicates the exterior side of the wall. If the blue arrow is inside the building, click on the blue arrow and it will flip the orientation of the wall.

If necessary, move walls so they are aligned with the floor plan's walls.

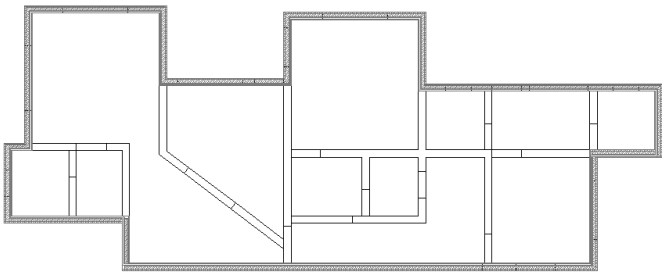
29. 

Switch to a 3D view.

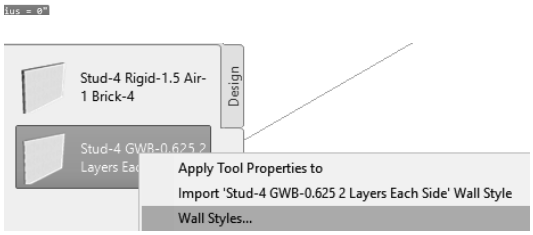
You should see 3D walls where you selected lines.

30. 

To join the walls together, use FILLET with an R value of 0.
Type FILLET, then select the two walls to be joined to form a corner.

31. 

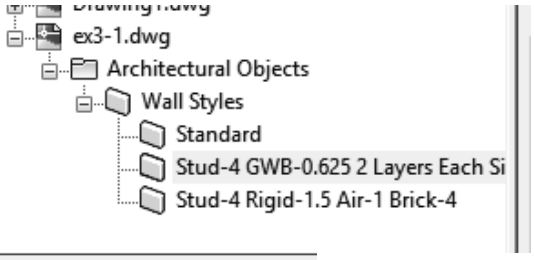
In the plan view, the exterior walls should form a closed figure.

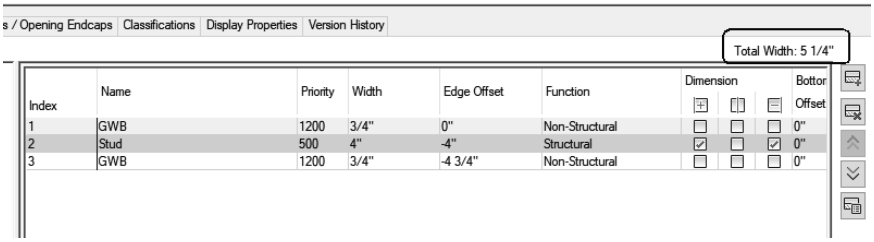


Locate the **Stud-4 GWB-0.625-2 Layers Each Side** Wall Style.

Right click and select Wall Styles.
This will launch the Styles Manager.

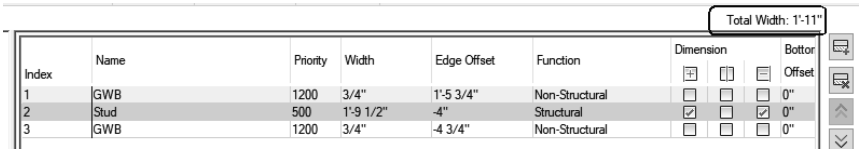
32. Highlight the **Stud-4 GWB-0.625-2 Layers Each Side** Wall Style in the Style Manager list.





Select the **Components** tab.

The total width for this wall style is 5 ¼"

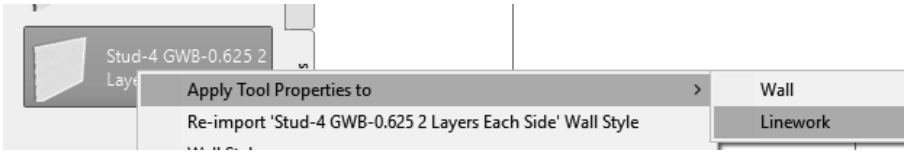
33. 

Change the Stud width to **1′ 9 1/2″**.

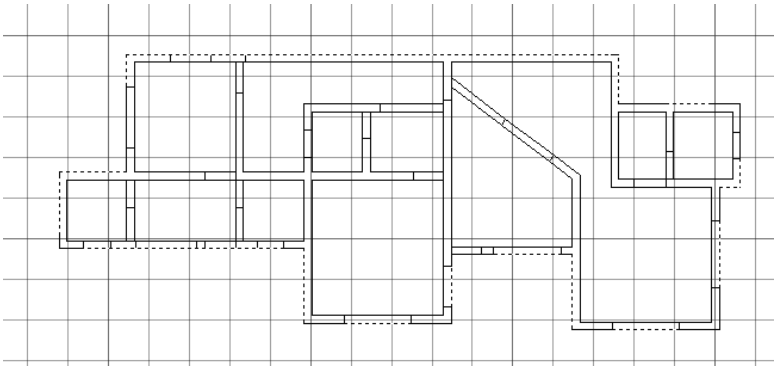
Adjust the positions of the components so that the wall looks proper.

Press **OK** to close the Style Manager.

34. Select the **Stud-4 GWB-0.625-2 Layers Each Side** wall style.



Right click and select **Apply Tool Properties to → Linework**.

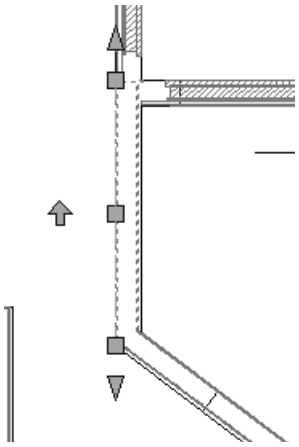
35. 

Select the inside segments of the walls.

Do not select any of the exterior walls.

Press ENTER when you are done selecting lines.

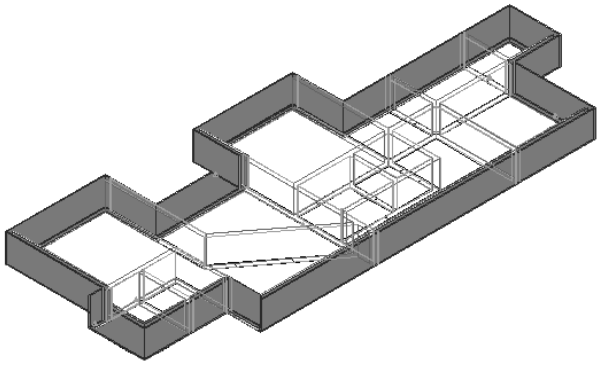
36. You will be prompted if you want to erase any of the line work. Enter **NO**.

37. 

Zoom into one of the walls that was placed. Note that it is the correct width.

The blue arrow indicates the exterior side of the wall. If the blue arrow is inside the building, click on the blue arrow and it will flip the orientation of the wall. Because these are interior walls with gypsum board on both sides, the orientation doesn't matter.

If necessary, move walls so they are aligned with the floor plan's walls.

38. 

Use the TRIM, EXTEND, and FILLET tools to edit the interior walls.

39. 

Some of your walls may display a warning symbol.

This means that you have walls overlapping each other.

Check to see if you have more than one wall or if you need to trim the walls.

40. Save as *ex3-1.dwg*.

The ex3-1 file can be downloaded from the publisher's website, so you can check your file against mine and see how you did.

Exercise 3-2:

Importing a PDF into ACA

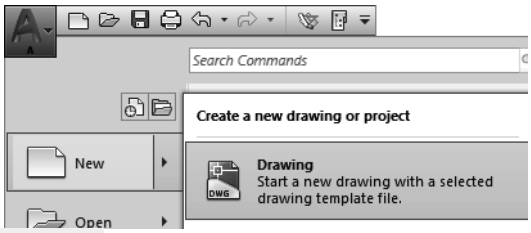
Drawing Name: New
Estimated Time: 10 minutes

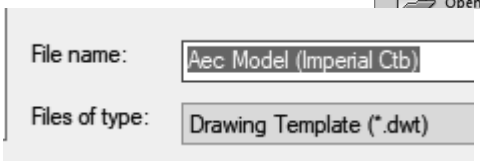
This exercise reinforces the following skills:

- Import PDF
- Create Walls
- Wall Properties
- Wall Styles
- Model and Work space

1. Go to the Application Menu (the Capital Letter A).

   Select **New→Drawing**.



2. 

   Select the *Aec Model (Imperial Ctb)* template.

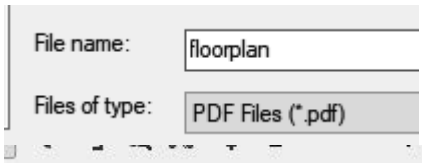
   Press **Open**.

   Note this template uses Architectural units.

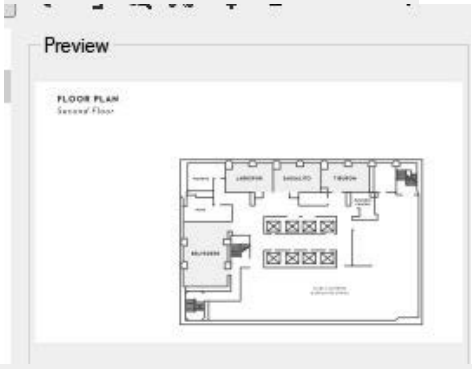
3. 

   Activate the **Insert** ribbon.

   Select the **Import PDF** tool (located in the middle of the ribbon).

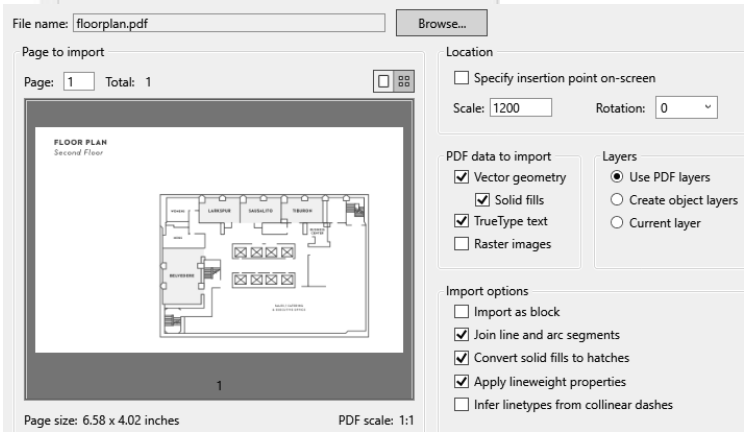
4. 

Select the *floorplan.pdf* file.

5. 

You will see a preview of the pdf file.

Press **Open**.



6. Uncheck specify insertion point on-screen.

   This will insert the pdf to the 0,0 coordinate.

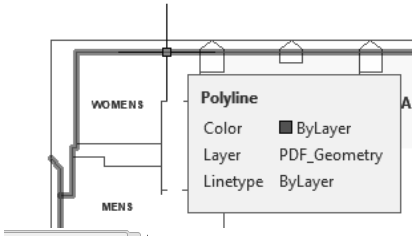
   Set the Scale to **1200**.

   This will scale the pdf.

   Set the rotation to 0.

   Enable Vector Geometry.
   Enable Solid Fills.
   Enable TrueType Text.
   This will convert any text to AutoCAD text.
   Enable Join line and arc segments.
   Enable Convert solid fills to hatches.
   Enable Apply lineweight properties.
   Enable Use PDF layers.

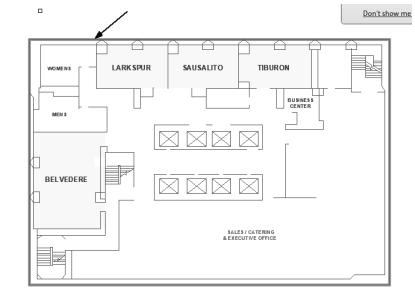
   Press OK.

7. 

Notice if you hover your mouse over any of the elements imported, they have been converted to ACA elements.

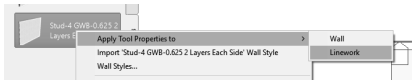
8. 

Highlight the **Stud-4 Rigid** wall style on the tool palette.
Right click and select **Apply Tool Properties to Linework.**

9. 

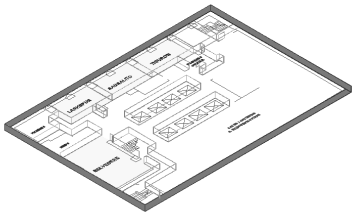
Select the outside polyline on the floorplan.

When prompted to erase existing lines, select **No**.

10. 

Highlight the **Stud 4- GWB** wall style.
Right click and select **Apply Tool Properties to Linework.**

When prompted to erase existing lines, select **No**.

11. 

Use the FILLET, TRIM, and EXTEND tools to place the interior walls.

12. Save as *ex3-2.dwg*.

You can compare your drawing with mine and see how you did.

Exercise 3-3:

Creating Walls

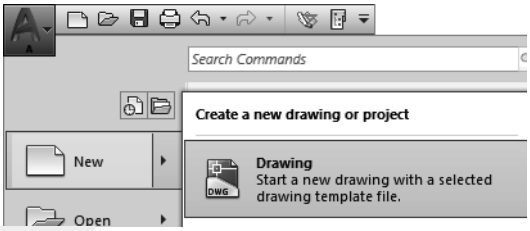
Drawing Name: New
Estimated Time: 10 minutes

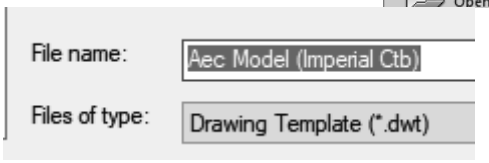
This exercise reinforces the following skills:

- Create Walls
- Wall Properties
- Wall Styles
- Model and Work space

1. Go to the Application Menu (the Capital Letter A).

   Select **New→Drawing**.

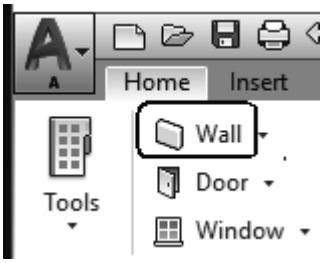


2. 

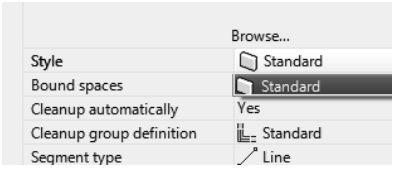
   Select the *Aec Model (Imperial Ctb)* template.

   Press **Open**.

   Note this template uses Architectural units.

3. 

   Select the **Wall** tool from the Home ribbon.

4. 

   In the Properties dialog, check under the Style drop-down list.

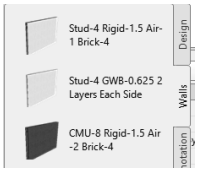
   Only the Standard style is available.

   This is the wall style that is loaded in the template.

5. Exit out of the command by pressing ESC.

6. 

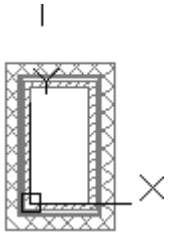
Launch the Design Tools palette from the Home ribbon.

7. 

Select the Walls palette.

8. 

Select the **CMU-8 Rigid-1.5 Air 2 Brick-4** wall style.

9. 
Toggle **ORTHO** ON.

Start the wall at 0,0.
Create a rectangle 72 inches [1830 mm] tall and 36 inches [914 mm] wide.

You can use Close to close the rectangle.

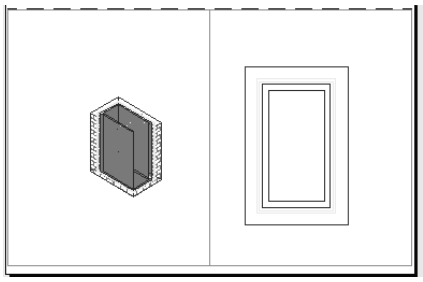
Place the walls as if you are drawing lines.

10. Go to the **View** ribbon.

11. 

Toggle on the Layout tabs.

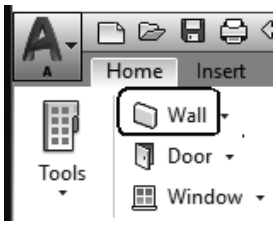
12. Select the **Work** tab now visible in the lower left corner of the screen.


13. 
The work tab opens up a layout with two viewports. One viewport is 3D and the other viewport is a top view.

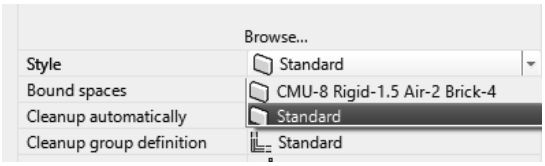
You see that the walls you placed are really 3-dimensional.

14. 

Switch back to the Model space tab.

15. 

Select the **Wall** tool from the Home ribbon.

16. 

In the Properties dialog, check under the Style drop-down list.

Note that the CMU wall style is now available under the drop-down list.

17. Exit out of the command by pressing ESC.

18. Save your drawing as e*x3-3.dwg*.

- If you draw a wall and the materials composing the wall are on the wrong side, you can reverse the direction of the wall. Simply select the wall, right click and select the Reverse option from the menu.
- To add a wall style to a drawing, you can import it or simply create the wall using the Design Tools.
- Many architects use external drawing references to organize their projects. That way, teams of architects can concentrate just on their portions of a building. External references also use fewer system resources.
- You can convert lines, arcs, circles, or polylines to walls. If you have created a floor plan in AutoCAD and want to convert it to 3D, open the floor plan drawing inside of AutoCAD Architecture. Use the Convert to Walls tool to transform your floor plan into walls.
- To create a freestanding door, press the ENTER key when prompted to pick a wall. You can then use the grips on the door entity to move and place the door wherever you like.
- To move a door along a wall, use Door→Reposition→Along Wall. Use the OSNAP From option to locate a door a specific distance from an adjoining wall.

Exercise 3-4:

Creating a Floor Plan Using an Image

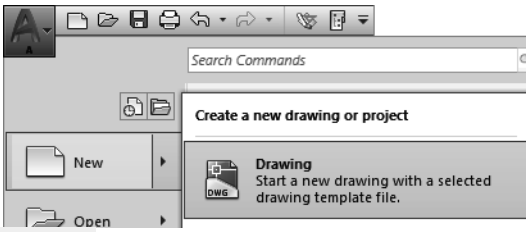
Drawing Name: new.dwg
Estimated Time: 60 minutes

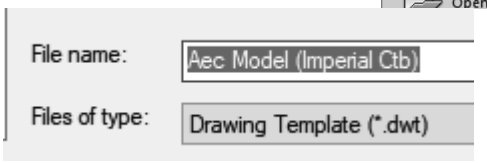
This exercise reinforces the following skills:

- Insert Image
- Add Wall

1. Go to the Application Menu (the Capital Letter A).

   Select **New→Drawing**.

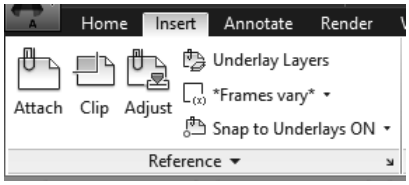


2. 

   Select the *Aec Model (Imperial Ctb)* template.

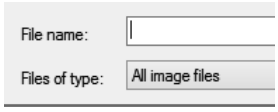
   Press **Open**.

   Note this template uses Architectural units.

3. 

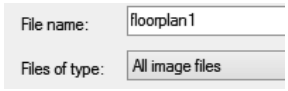
   Select the **Insert** ribbon.

   Select the **Attach** tool.

4. 

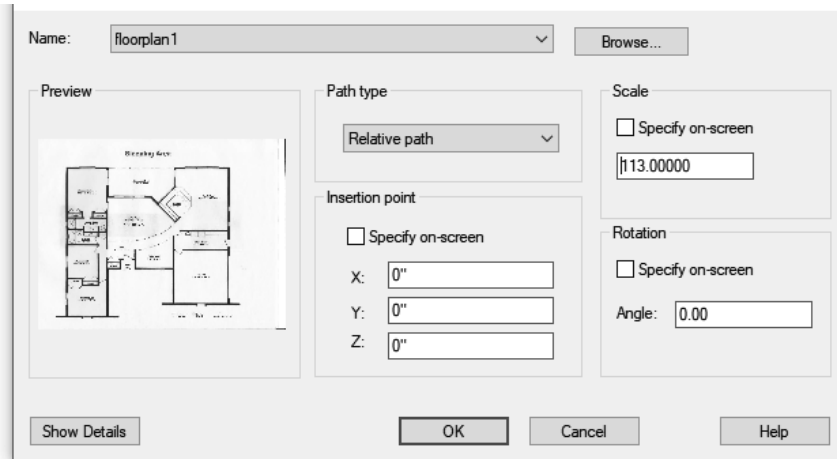
   Browse to the folder where the exercises are stored.

   Change the Files of type to **All image files**.

5. 

   Select the *floorplan1* file.

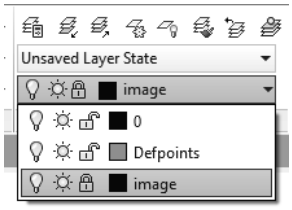
   Press **Open**.

6. 

Uncheck the insertion point to insert the image at **0, 0, 0**.

Set the Scale to **113.00**.
Set the Angle to **0.0**.

Press **OK**.

7. 

To prevent your image from moving around:

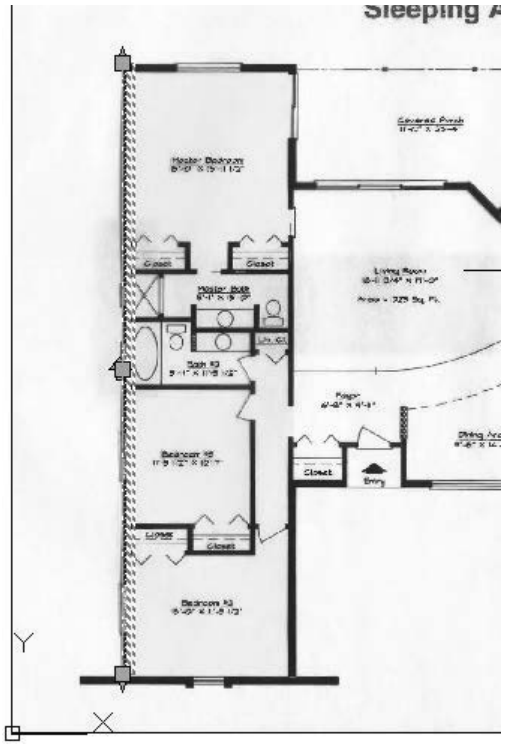
Create a new layer called image.
Select the image.
Right click and select Properties.
Assign the image to the image layer.
Lock the image layer.

8. 

Open the Design Tools palette.
Select the Walls palette.

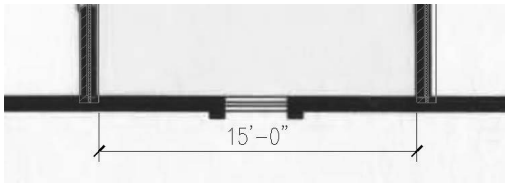
9. 

Locate the **Stud-4 Rigid 1.5 Air-1 Brick-4** wall style.

10. 

Draw a wall on the far left side of the floor plan, tracing over the wall shown in the image file.

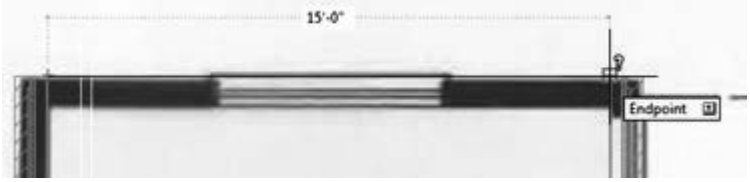
Orient the wall so the exterior side of the wall is on the outside of the building.

11. 

Offset the wall 15′ 11-1/8″ to the right.

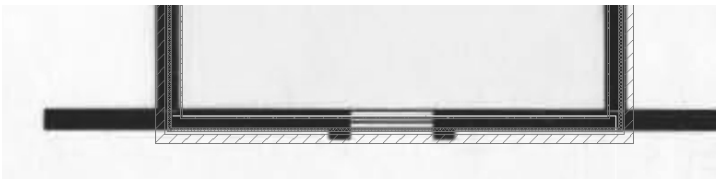
The additional offset takes into account the wall thickness of 11-1/8".

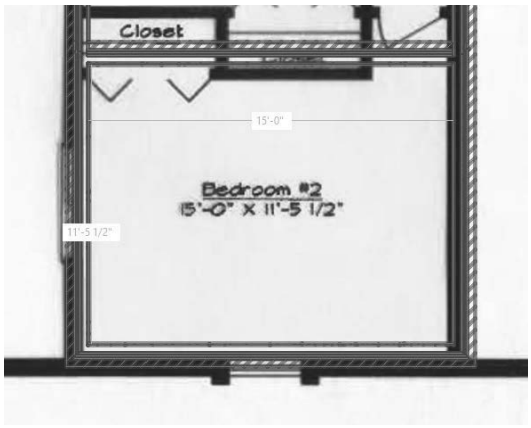
Flip the wall orientation so the wall exterior is on the outside of the building.



Check the offset distance to ensure the two walls are 15′ apart from inside finish face to inside finish face.

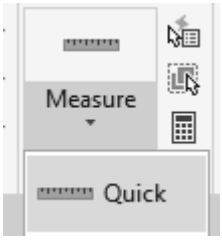
12. Trace a horizontal wall using the **Stud-4 Rigid 1.5 Air-1 Brick-4** wall style.



13. 

Offset the horizontal wall 12′ 4.625″. *This is 11' 5 1/2" plus 11 1/8".*

Verify that the distance from finish face to finish face is 11’ 5 ½″ using the Quick Measure tool.

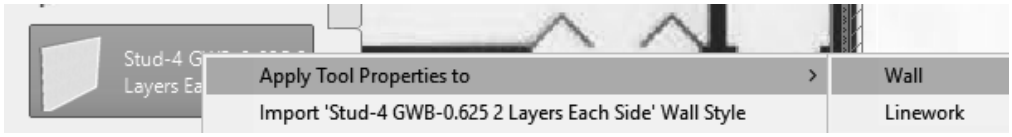


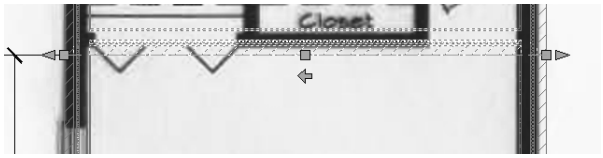
Select the **Quick Measure** tool from the Home ribbon and hover over one of the bedroom walls.

14. 

Locate the **Stud-4 GWB-0.625 Each Side** wall style on the Walls palette.

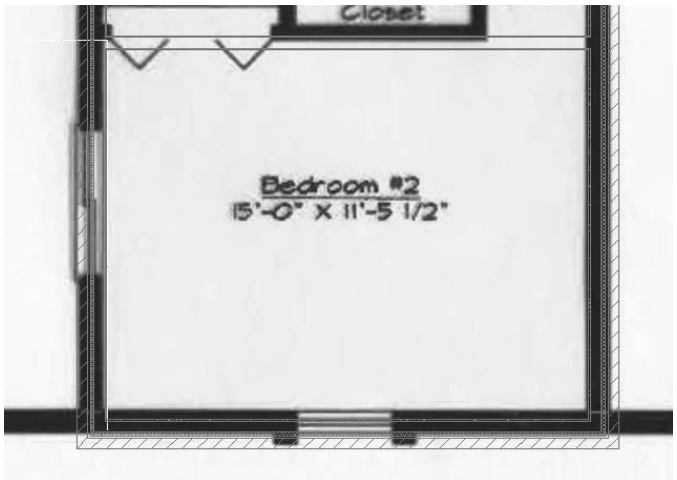
15. Right click and select **Apply Tool Properties to → Wall**.



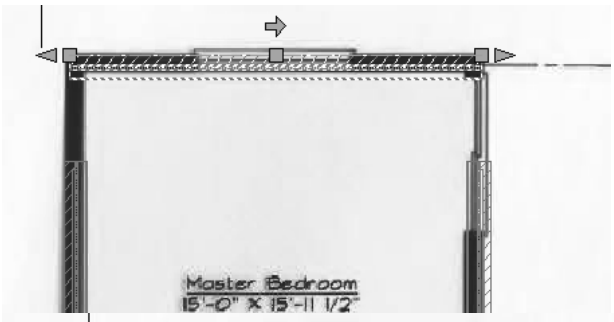
16. 

Select the upper horizontal wall.

Press **ENTER**.

17. 

The wall style will update.

18. 

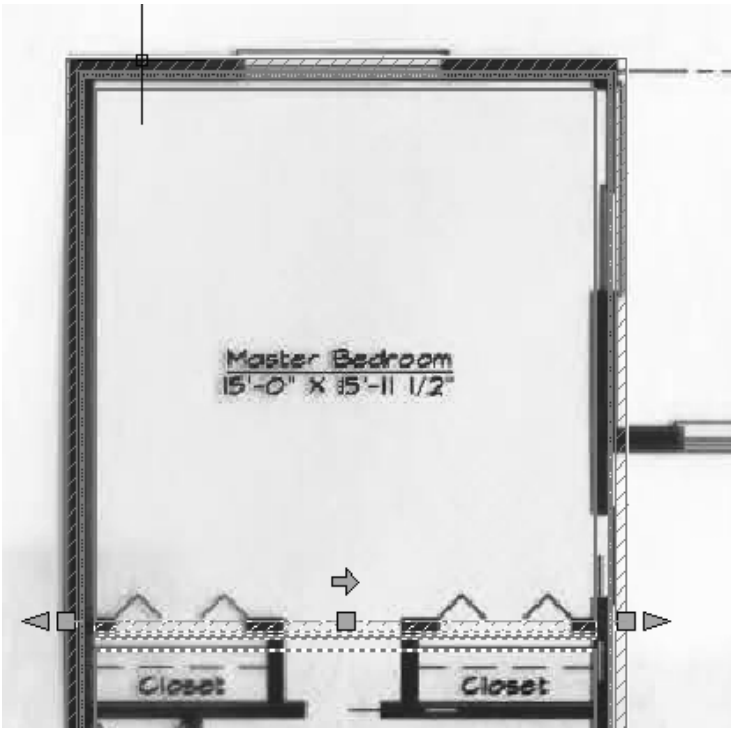
Place a **Stud-4 Rigid 1.5 Air-1 Brick-4** wall at the top horizontal location of the Master Bedroom.

Verify that the orientation is for the exterior side of the wall outside the building.

19. 

Use the FILLET command to create corners between the vertical and horizontal walls.

Type FILLET and select the horizontal wall, then select a vertical wall. Repeat for the other side.

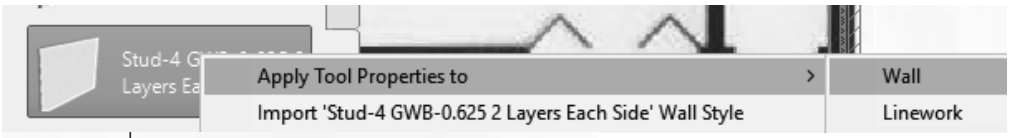
20. 

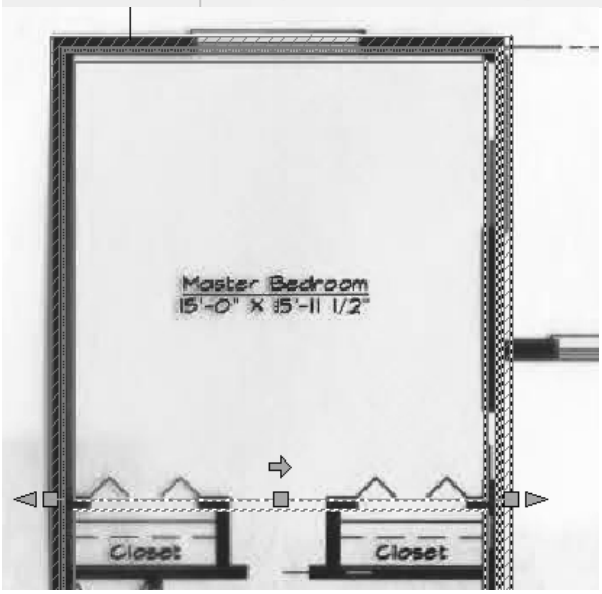
Offset the top horizontal wall 16′ 10.625″.

21. 

Locate the **Stud-4 GWB-0.625 Each Side** wall style on the palette.

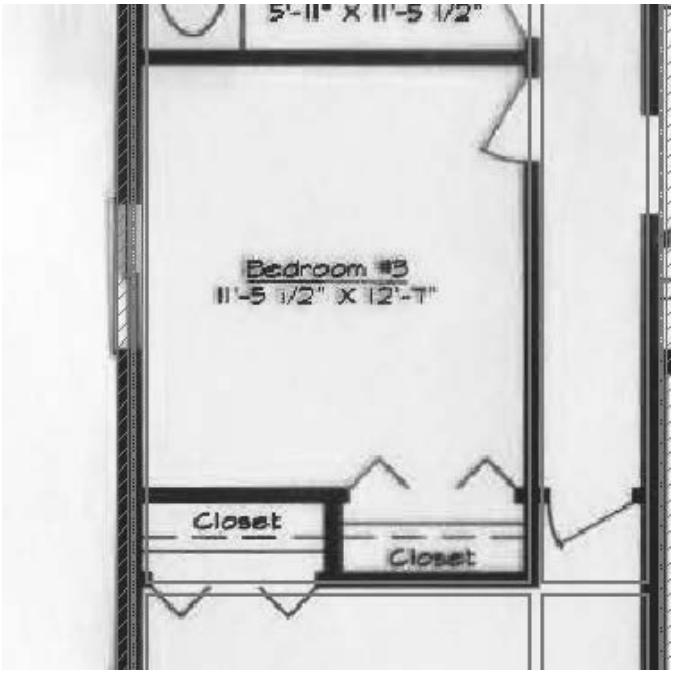
22. Right click and select **Apply Tool Properties to → Wall**.



23. 

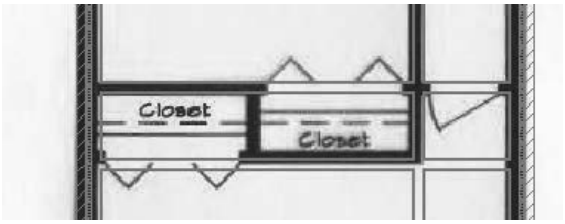
Select the lower horizontal wall.

Press **ENTER**.

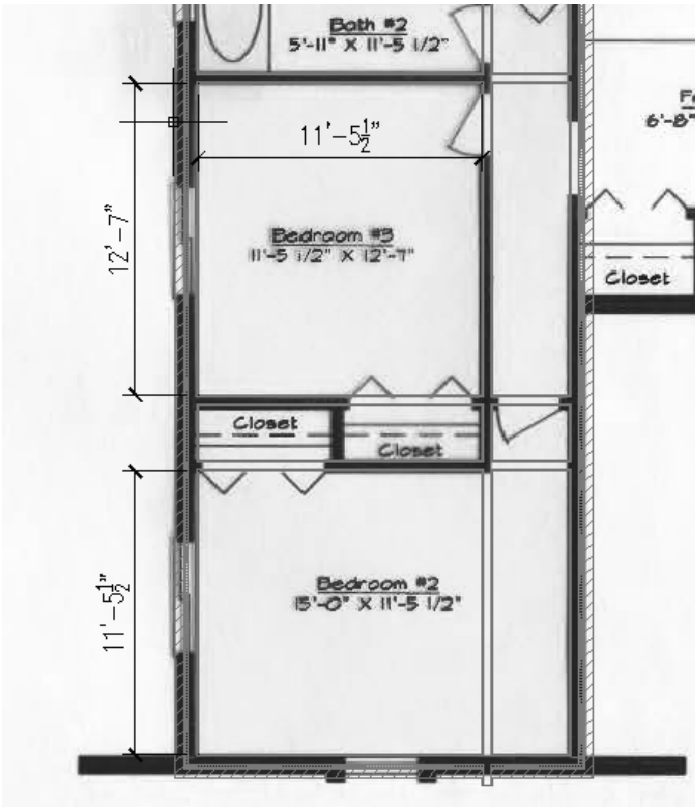
24. 

Offset the left vertical exterior wall **12′ 4.625″**.

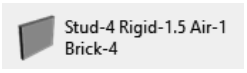
Change the offset wall to the interior **Stud-4 GWB-0.625 Each Side** wall style using the **Apply Tool Properties to → Wall**.

25. 

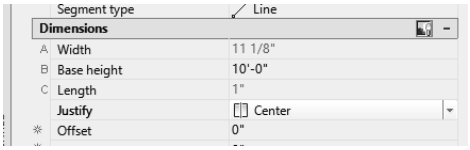
Use an offset of 2′ 0″ to create the closet space.

26. 

Adjust the position of the walls as needed to ensure they match the floor plan image.

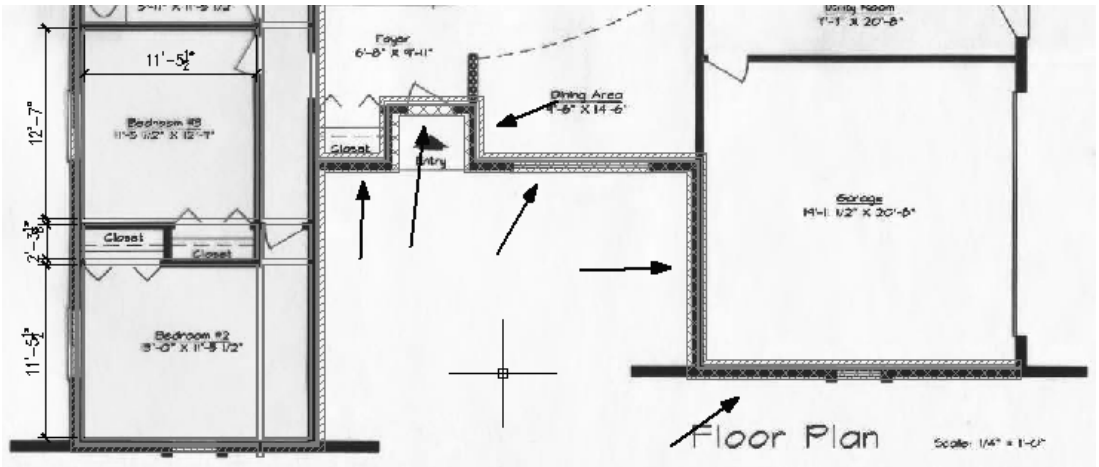
27. 

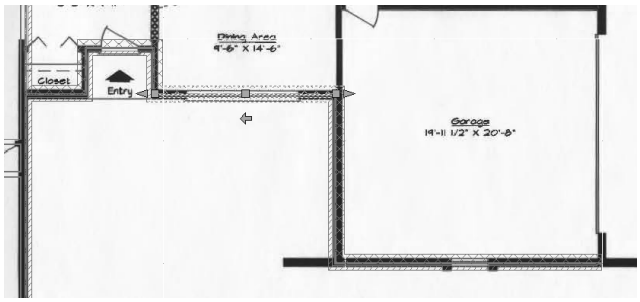
Select the **Stud-4 Rigid 1.5 Air-1 Brick-4** wall tool from the Design Tools palette.

28. 

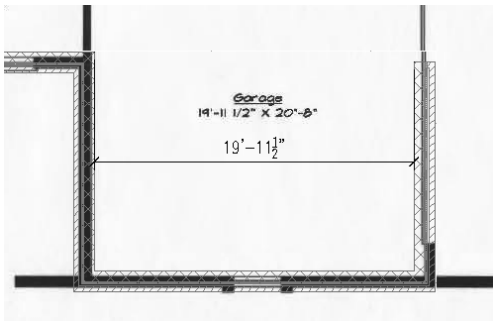
On the Properties palette, set the Justify option to **Center**.

29. Trace the remaining south walls of the floor plan.



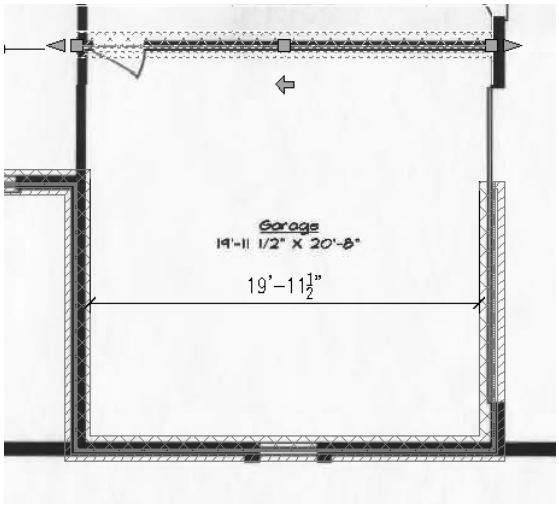
30. 

Use the flip arrows to orient the exterior side of the walls to the outside of the building.

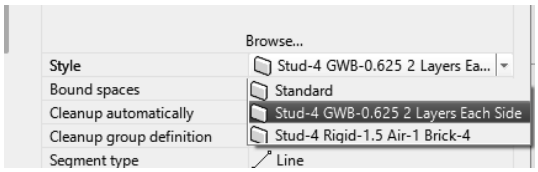
31. 

Offset the left garage wall 21′ 3″.

Verify that the dimension from face to face of the interior side of the walls is 19′ 11 ½″.

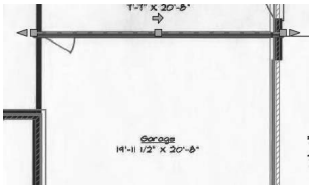
32. 

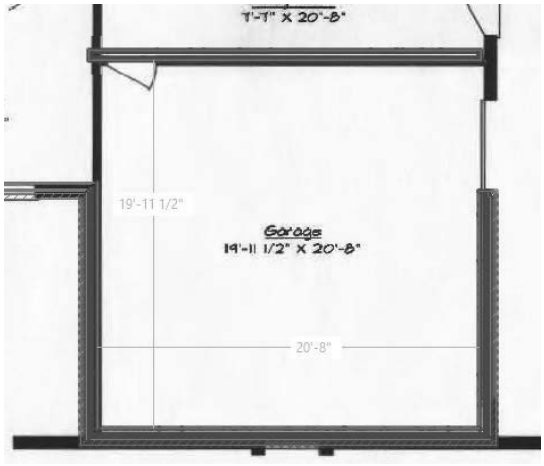
Offset the south garage wall 20′ 8″.

33. 

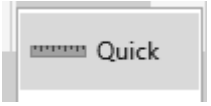
Select the north garage wall.

In the Properties palette:
Change the wall style to **Stud-2.5 GWB-0.625 Each Side**.

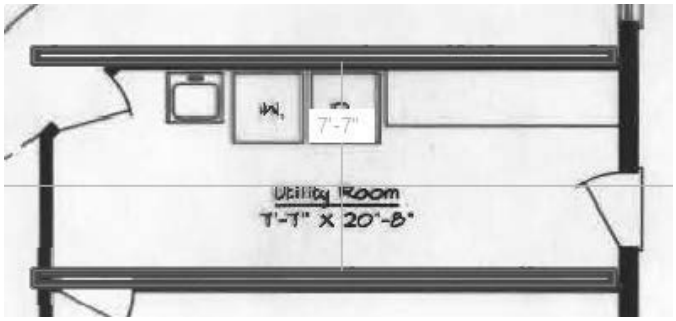


34. 

Adjust the position of the garage walls so the distance from interior face to interior face north-south is 20′ 8″ and the distance from interior face to interior face west-east is 19′ 11½″.

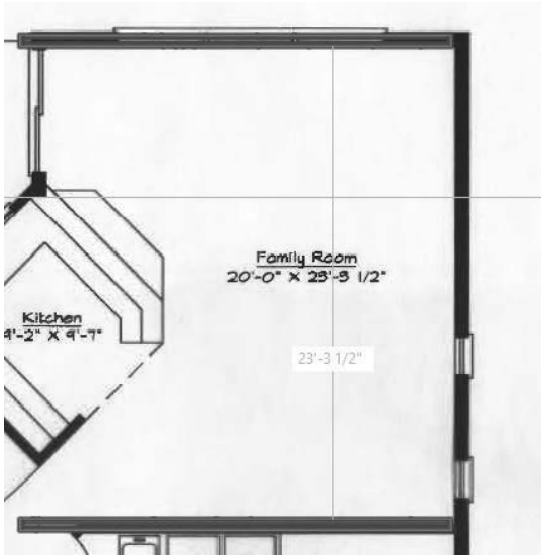


Use the Quick Measure tool to verify the dimensions.

35. 

Offset the south utility room wall up 8′ ¼″.

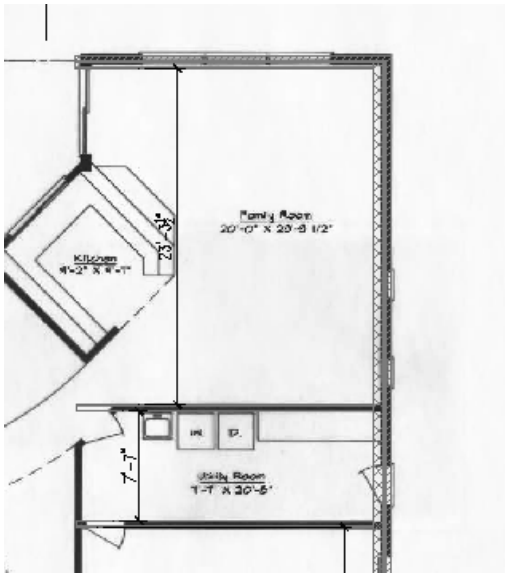
Verify that the distance from interior face to interior face is 7′ 7″.

36. 

Offset the north utility wall 23′ 9.1325″.

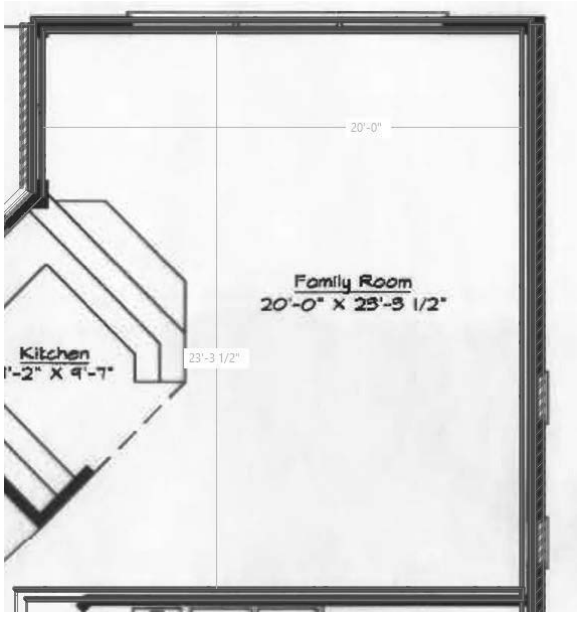
Assign the top wall to the **Stud-4 Rigid 1.5 Air-1 Brick-4** wall style.

Verify that the distance from interior face to interior face is 23′ 3½″.

37. 

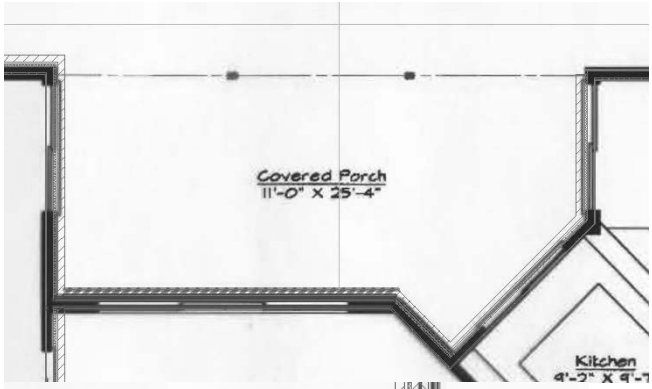
Use the FILLET command to create the northeast corner of the building.

The east wall is located in the Garage area, so you may need to scroll down to select it for the FILLET.

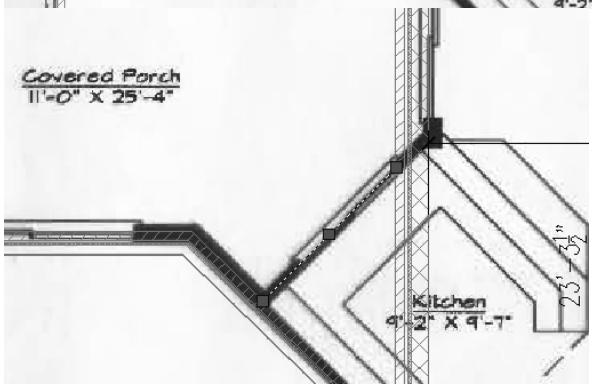
38. 

Place the west family room wall.

Verify that the distance from interior face to interior face is 20′ 0″.

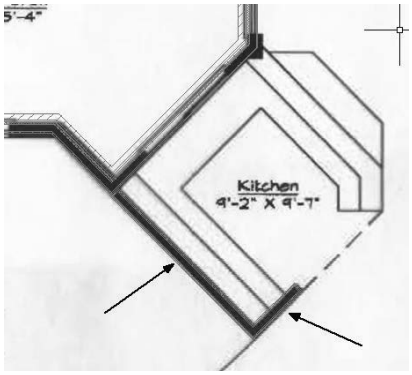
39. 

Trace over the floor plan to place the **Stud-3.5 Rigid 1.5 Air-1 Brick-4 Wall** walls for the covered porch.

40. 

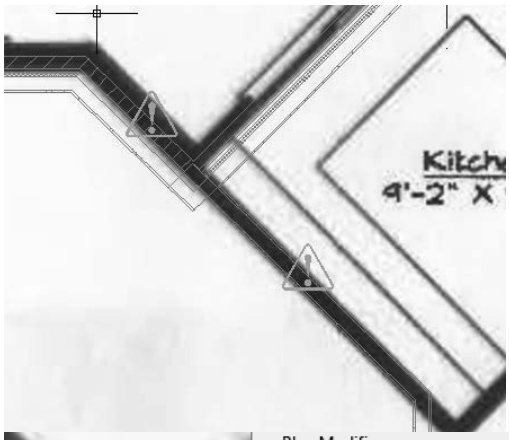
Draw an exterior wall **Stud-3.5 Rigid 1.5 Air-1 Brick-4 Wall** at a 45° angle to designate the wall for the kitchen.

Use the POLAR option to make it easier to place the walls.

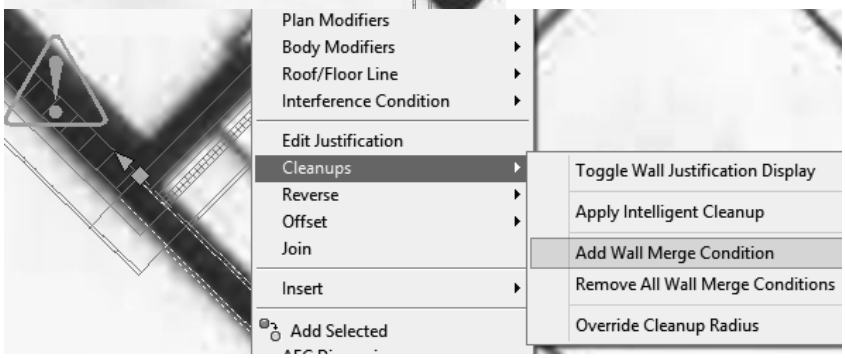
41. 

Place interior wall segments in the kitchen area using the interior wall style **Stud-2.5 GWB-0.625 Each Side**.

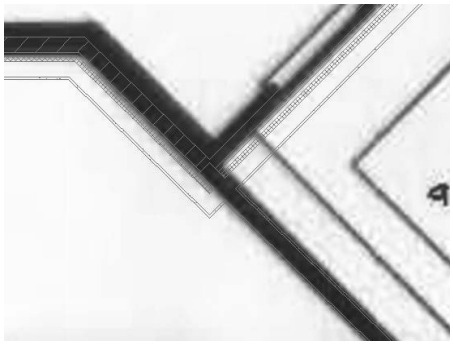
.



A triangle symbol with an exclamation point indicates that you have a wall interference condition – usually a wall on top of a wall.

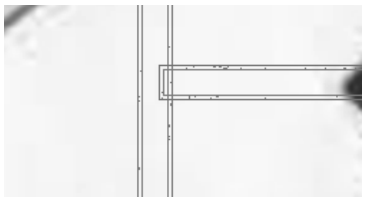


Select the interior wall with the interference condition. Right click and select **Cleanups → Add Wall Merge Condition**.

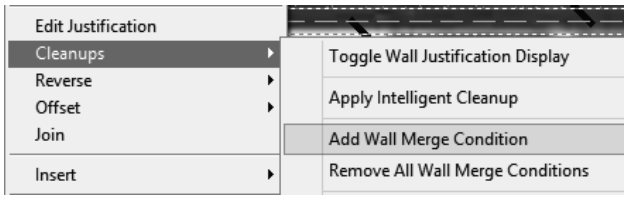


Select the two exterior walls where it is interfering.

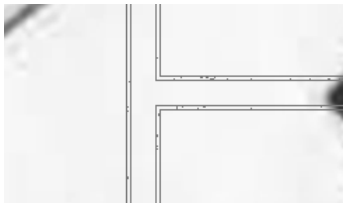
The walls will merge and clean up the intersection area.

42. 

Zoom into the area near the utility room and notice some of the walls may need to be cleaned up as well.

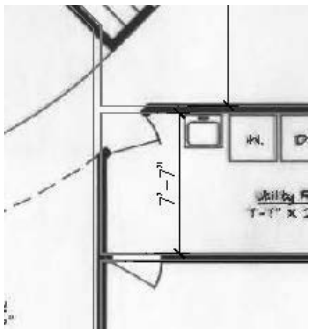
43. 

Select one of the interior walls. Right click and select **Cleanups → Add Wall Merge Condition**.

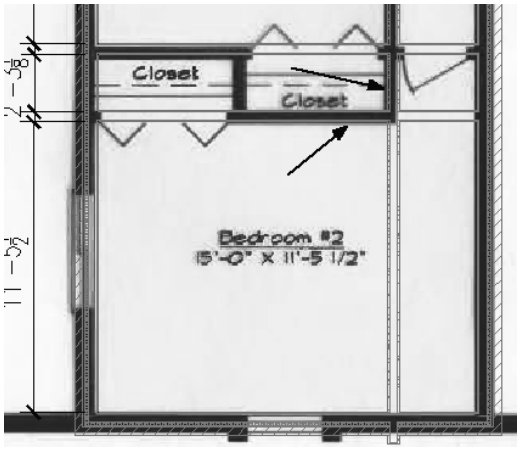
44. 

Select both walls.

The wall intersection cleans up.

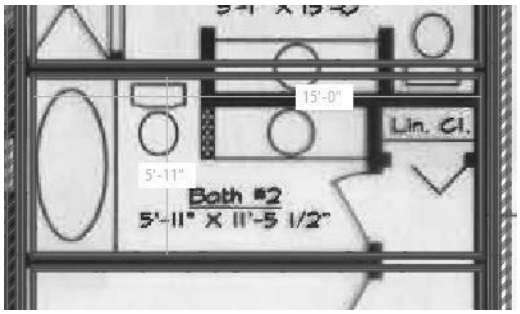
45. 

Repeat for the south utility wall.

46. 

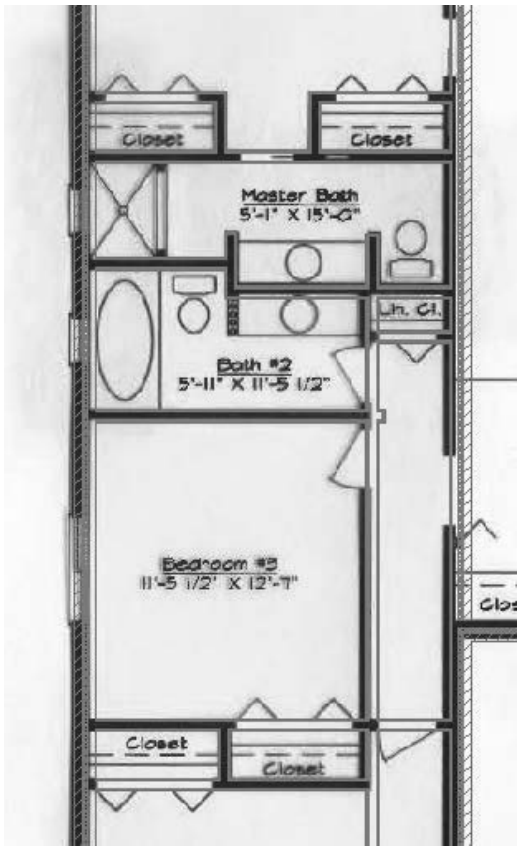
Zoom into the Bedroom #2 area.

Use FILLET to eliminate the extra interior walls. Select the walls at the locations indicated to clean up the room.

47. 

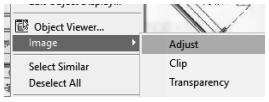
Offset the south bathroom wall 6′ 4.25″.

Verify that the distance from interior face to interior face is 5′ 11″.

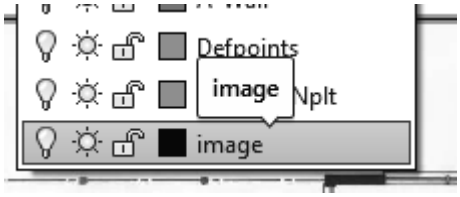
48. 

Add the interior walls for the lavatory areas.

Use the wall style **Stud-4 GWB-0.625 Each Side**.

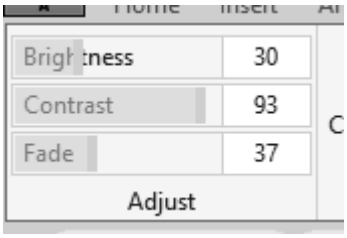
49. 

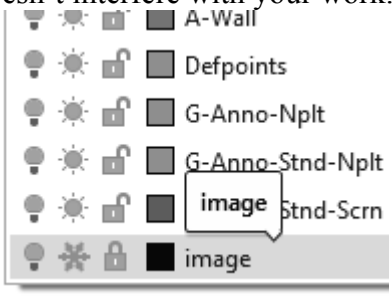
Unlock the image layer.



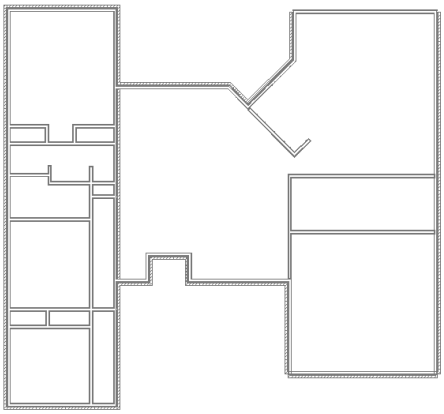
Select the image.

50. On the ribbon:
On the Adjust panel.
You can adjust how much of the image you see so it doesn't interfere with your work.





Alternatively, you can freeze the image layer or change the transparency of the layer.

51. 

You should have a completed floor plan.

Save as *ex3-4.dwg*.

Exercise 3-5:

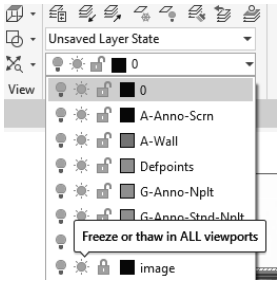
Adding Doors

Drawing Name: Ex3-4.dwg
Estimated Time: 45 minutes

This exercise reinforces the following skills:

- Adding Doors
- Door Properties

1.  Open *ex3-4.dwg.*

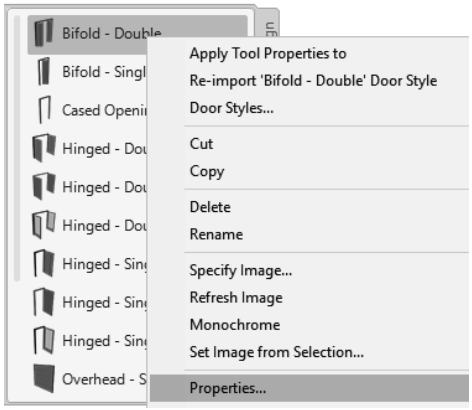
2. 

Thaw the image layer so you can see where doors are located if you froze that layer or adjust the image so you can see the door locations.

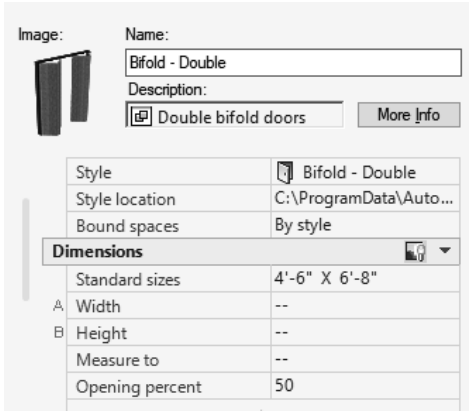
3. 

Open the Design Tools palette.


Select the Doors tab on the palette.

4. 

Highlight the **Bifold - Double** door.
Right click and select **Properties**.

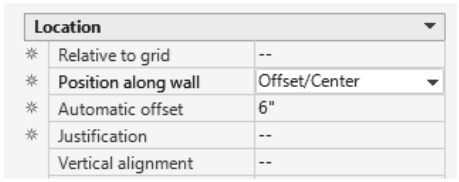
5. 

Expand the **Dimensions** section.
Set the size to
4′-6″ x 6′-8″.

Set the Opening percent to **50**.

If you left click in the Standard sizes field, a down arrow will appear…select the down arrow and you will get a list of standard sizes. Then, select the size you want.

A 25% opening will show a door swing at a 45-degree angle.
The value of the Opening percentage determines the angle of the arc swing.
A 50% value indicates the door will appear half-open at a 90-degree angle.

6. 

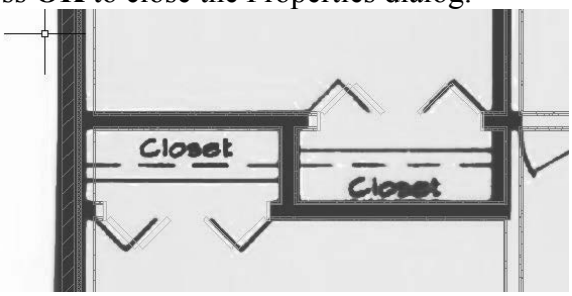
Expand the **Location** section.

Set Position along wall to **Offset/Center**.
This will allow the user to snap to the center position along the wall.

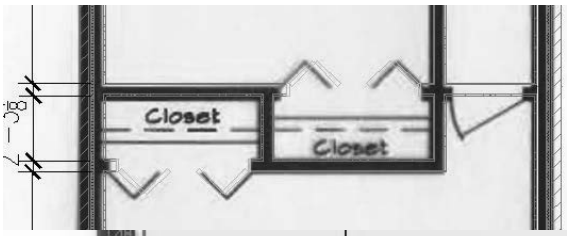
Press **OK** to close the Properties dialog.

7. Place the Bifold - Double doors at the two closets.

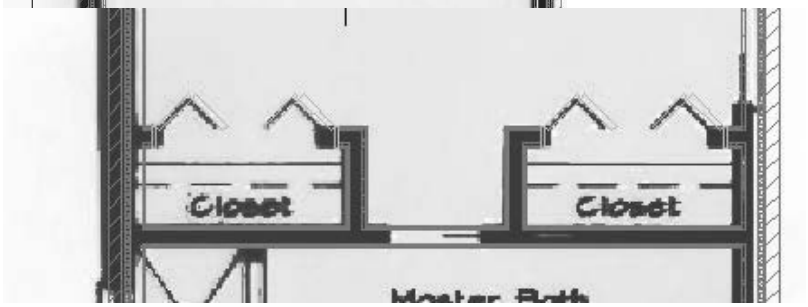
The orientation of the door swing is determined by the wall side selected.



In both cases, you want to select the outside face of the wall.
Center the closet door on each wall.

8. 

Place the **Bifold - Double** door at each of the closets located in Bedroom #2 and Bedroom #3.

9. 

Place the **Bifold - Double** door at the closets in the Master Bedroom.

10. 

Locate the **Bifold - Single** door on the Doors tab of the Design Tools palette.

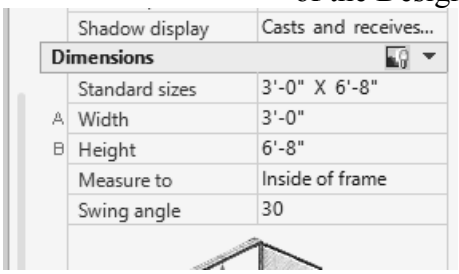
11. 

In the Properties palette:

Set the door to use the Standard Size **2′ 4″ x 6′ 8″**.
Set the Opening percent to **50**.
Press **OK** to close the Properties palette.
Place the door in the Linen Closet near the lavatories.

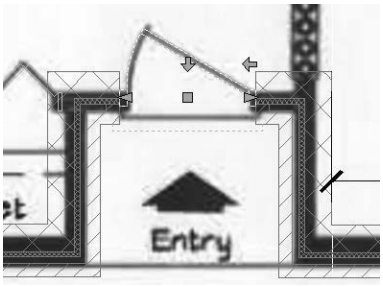
12. 

Locate the **Hinged - Single - Exterior** door on the Doors tab of the Design Tools palette.

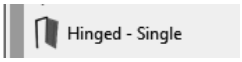
13. 

In the Properties palette,
set the door to use the size **3′ 0″ x 6′ 8″**.

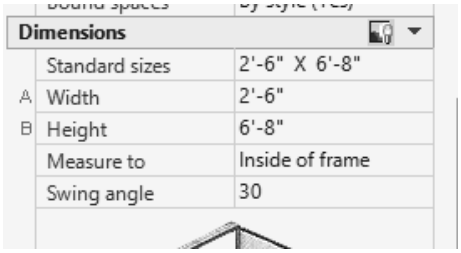
Set the Swing angle to **30**.

14. 

Select the side of the wall that will be used for the door swing and place the entry door.

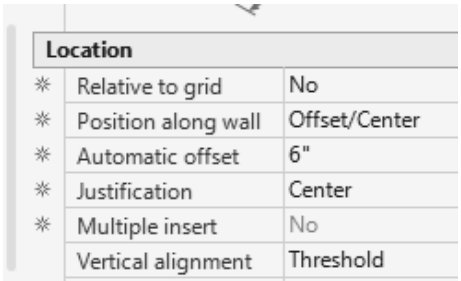
15. 

Locate the **Hinged - Single** door on the Doors tab of the Design Tools palette.

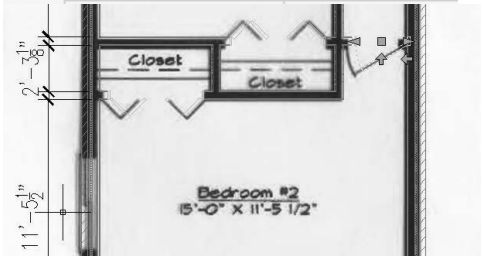
16. 

In the Properties palette, set the door to use the size **2′ 6″ x 6′ 8″**.

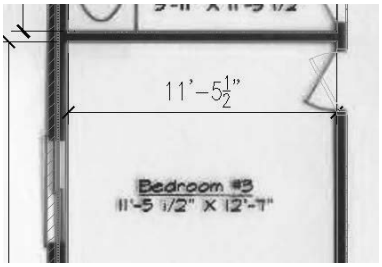
Set the Swing angle to **30**.

17. 

Set the Position along wall to **Offset/Center**.

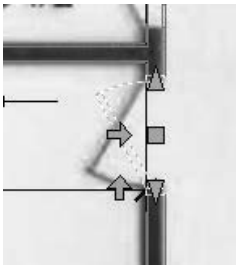
18. 

Place the door in Bedroom #2.

19. 

Place the door in Bedroom #3.

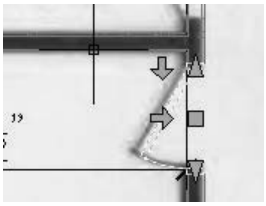
The swing is on the correct side but not the correct direction.

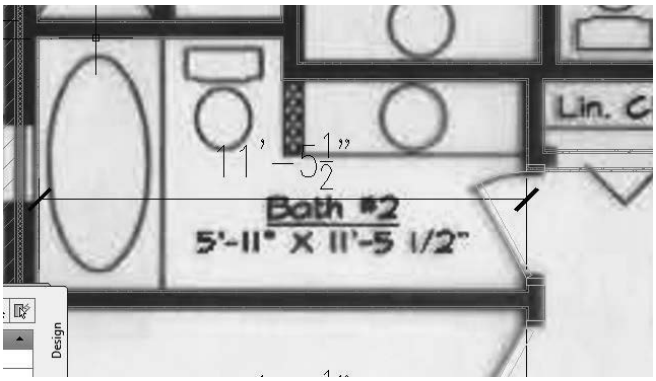
20. 
Select the door so it highlights.

The horizontal arrow flips the orientation of the door to the other side of the wall.

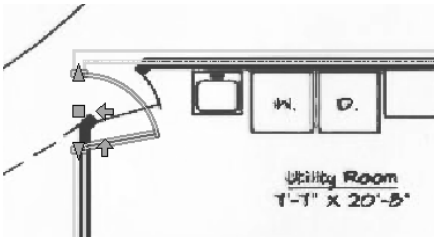
The vertical arrow flips the orientation of the door swing.

Left click on the vertical arrow.


The door updates to match the floor plan image.

21. 

Place a **Hinged - Single** door in Bath #2.

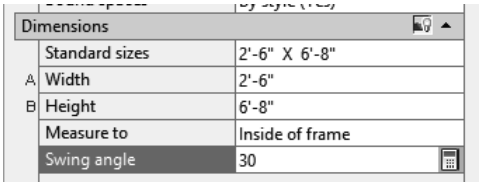
22. 

Place a **Hinged - Single** door in the Utility Room.
Change the size to 3'-0" x 6'-8".

Set the swing angle to **80**.

23. 

Locate the **Hinged - Single - Exterior** door on the Doors tab of the Design Tools palette.

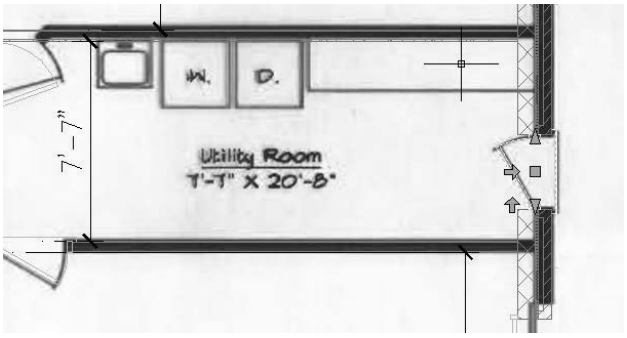
24. 

In the Properties palette,
set the door to use the Standard Size
2′ 6″ x 6′ 8″.

Set the Swing angle to **30**.

25. 

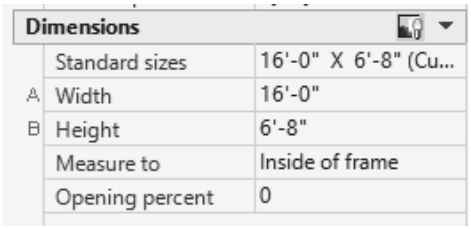
Place the door between the Utility Room and the Garage.

26. 

Place the door on the east wall of the Utility Room.

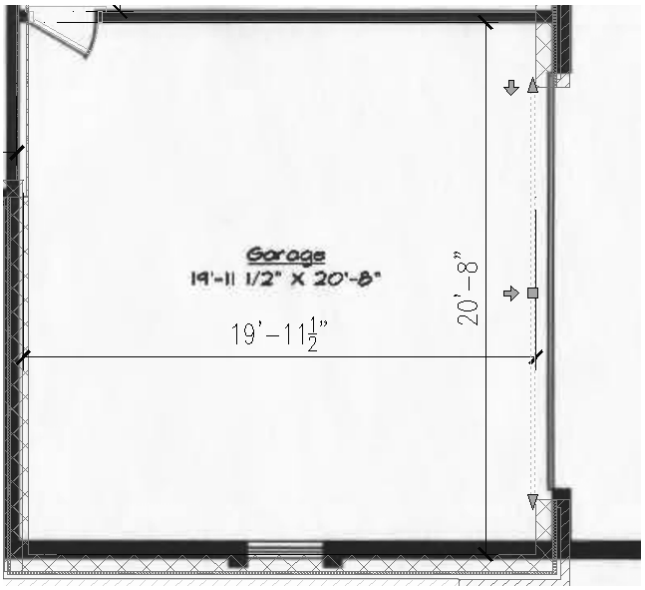
27. 

Locate the **Overhead - Sectional** door on the Doors tab of the Design Tools palette.

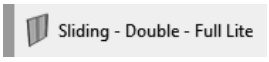
28. 

In the Properties palette, set the door to use the Size **16′ 0″ x 6′ 8″**.

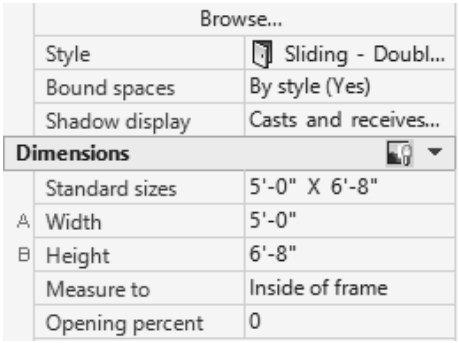
Set the Opening percent to **0**.

29. 

Place the garage door.

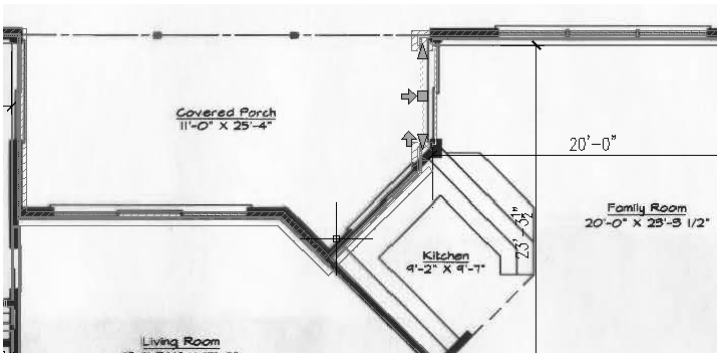
30. 

Locate the **Sliding - Double - Full Lite** door on the Doors tab of the Design Tools palette.

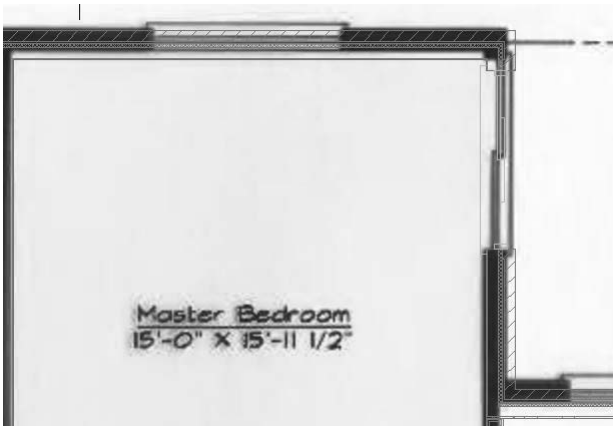
31. 

In the Properties palette, set the door to use the Standard Size **5′ 0″ x 6′ 8″**.

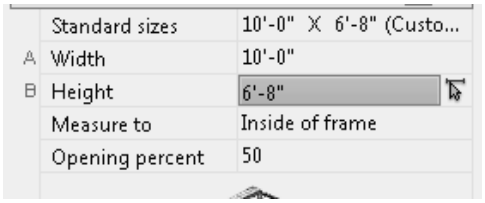
Set the Opening percent to **0**.

32. 

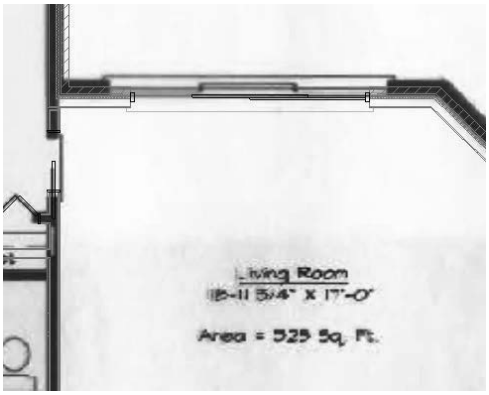
Place the door in the family room.

33. 

Place a second **Sliding - Double - Full Lite** door on the east wall of the Master Bedroom.

34. 

Set the door to use the size **10′ 0″ x 6′ 8″**.
Set the Opening Percent to **0**.

35. 

Center the door on the north wall of the Living Room.

36. 

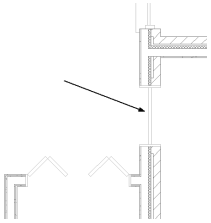
Locate the **Pocket - Single** door on the Doors tab of the Design Tools palette.

37.

Dimensions	
Standard sizes	--
A Width	2'-6"
B Height	6'-8"
Measure to	--
Opening per...	50

In the Properties palette.
set the door to use the size:
2′ 6″ x 6′ 8″.

Set the Opening percent to **50**.

38. 

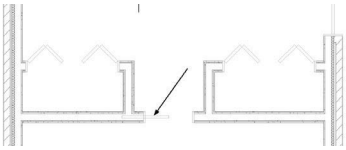
Place the door in the lower right corner of the Master Bedroom.

39.

Dimensions	
Standard sizes	2'-4" X 6'-8"
A Width	2'-4"
B Height	6'-8"
Measure to	Inside of frame
Opening percent	50

In the Properties palette,
set the door to use the Standard Size **2′ 4″ x 6′ 8″**.

Set the Opening percent to **50**.

40. 

Center the pocket door on the lower horizontal wall between the Master Bedroom closets.

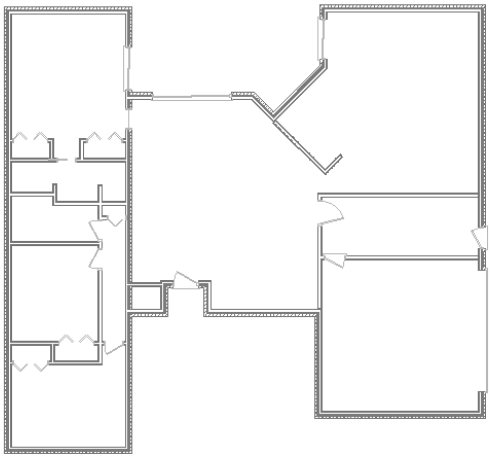
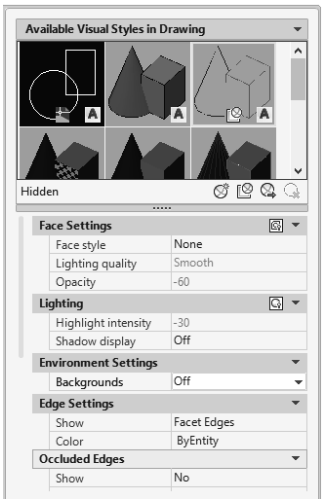
41. 

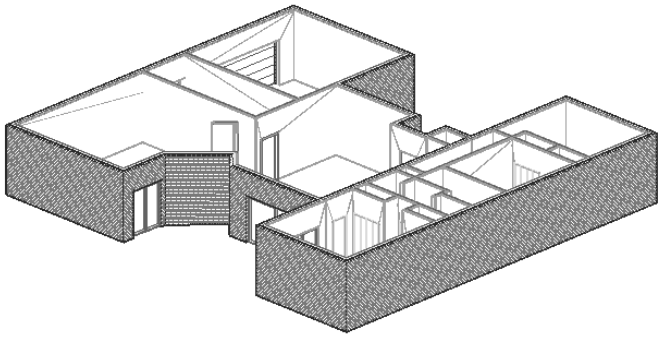
Image layer is frozen.

This is the floor plan so far.

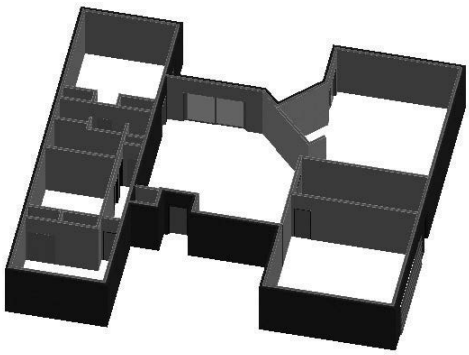
42. Save as *ex3-5.dwg*.

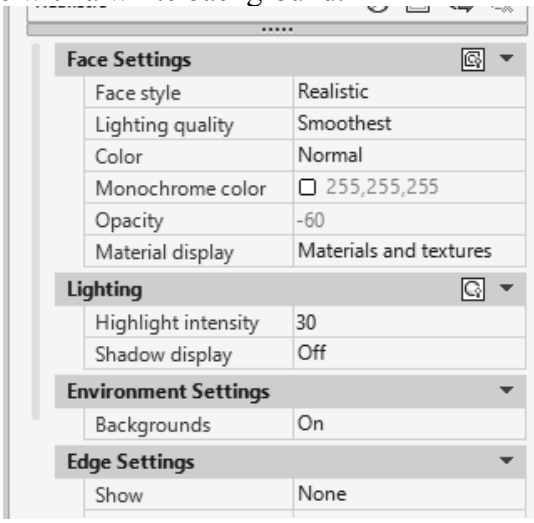
Switch to an isometric view and you will see that your model is 3D.





Look at the model using different visual styles. Which style do you like best? The model shown uses a Hidden visual style with a white background.





This is a Realistic style.

Exercise 3-6:

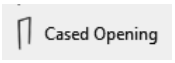
Create an Arched Opening Tool

Drawing Name: ex3-5.dwg
Estimated Time: 10 minutes

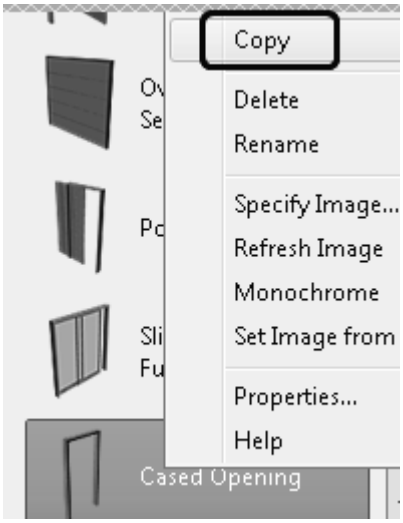
This exercise reinforces the following skills:

- Copying Tools
- Tool Properties

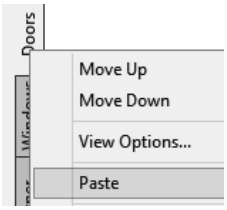
1. Open *ex3-5.dwg*.

2. 

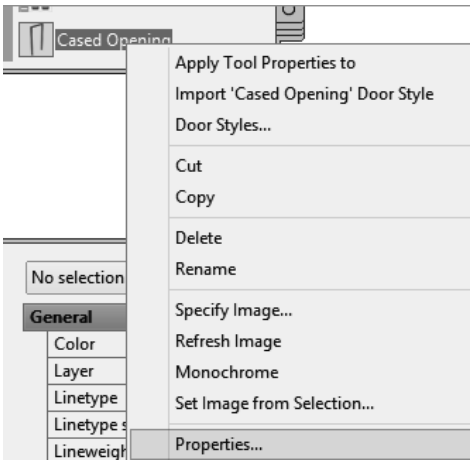
Locate the **Cased Opening** tool on the Doors palette.

3. 

Right click and select **Copy**.

4. 

Select the **Doors** tab.
Right click and select **Paste**.

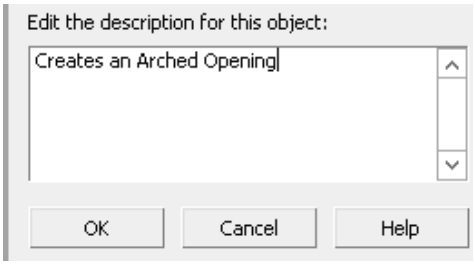
5. 

The copied tool is located at the bottom of the palette.

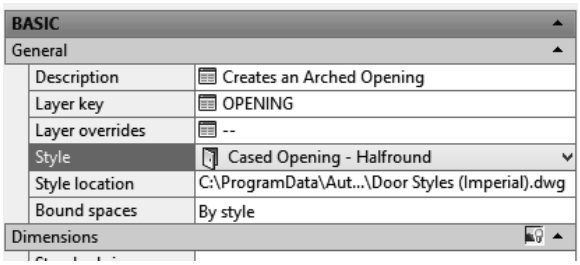
Highlight the copied tool.
Right click and select **Properties**.

6. 

Change the Name to **Arched Opening**.
Change the Description to **Arched Opening**.
Press **OK**.

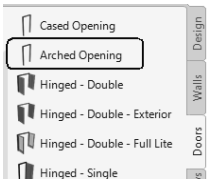
7. 

Expand the General section.
Set the Description to **Creates an Arched Opening**.
Press **OK**.

8. 

Set the Layer key to **OPENING**.
Set the Style to **Cased Opening-Half round**.

Press **OK**.



The tool is defined in the palette.

Move the tool up the palette to a new position.

9. Save as *ex3-6.dwg*.

Exercise 3-7:

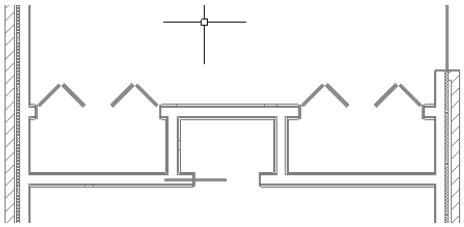
Adding an Opening

Drawing Name: ex3-6.dwg
Estimated Time: 15 minutes

This exercise reinforces the following skills:

- Adding Openings
- Opening Properties
- Copying Tools
- Set Image from Selection

Openings can be any size and elevation. They can be applied to a wall or be freestanding. The Add Opening Properties allow the user to either select a Pre-defined shape for the opening or use a custom shape.

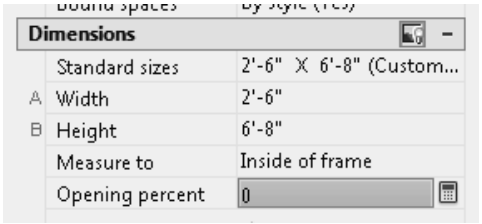


An opening will be added to the upper wall between the Master Bedroom closets.

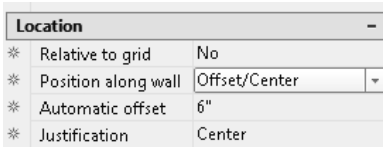
1. Open *ex3-6.dwg.*

2. 

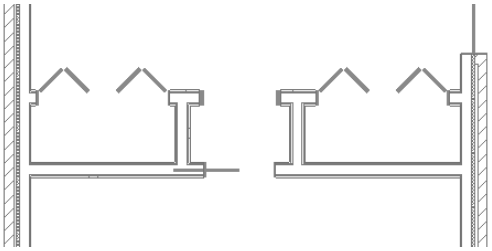
Select the **Arched Opening** tool.

3. 

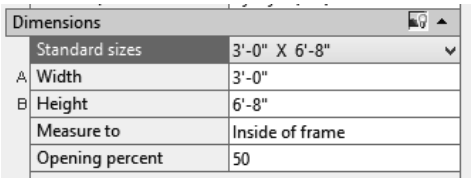
In the Properties palette, set the door to use the size **2′ 6″ x 6′ 8″**.

4. 

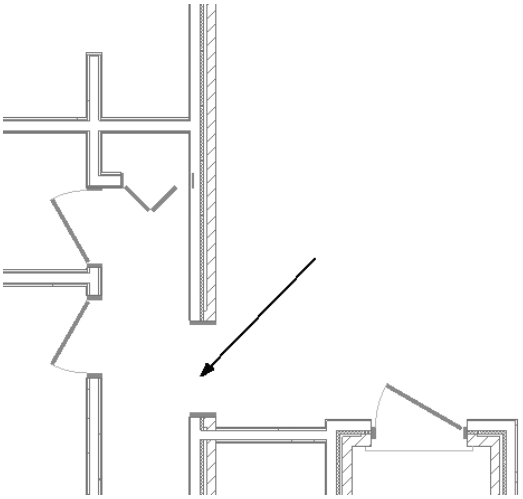
Expand the Location section in the Properties palette.
Set the Position along wall to **Offset/Center**.
Set the Automatic offset to **6″ [300.00]**.

5. 

Place the arched opening in the wall between the closets in the Master Bedroom. Center it on the wall.

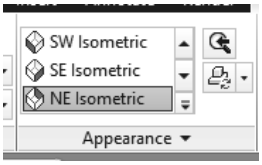
6. 

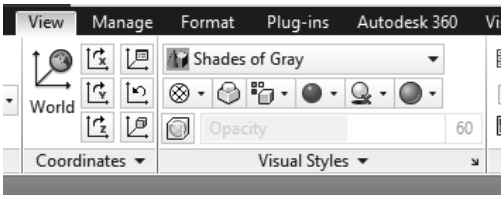
In the Properties palette, set the door to use the size **3′ 0″ x 6′ 8″**.

7. 

Place the Arched Opening on the left side of the Foyer above the Entry.

8. Use the View tools on the View ribbon **View → NE Isometric** and **3D orbit** to view the arched opening.

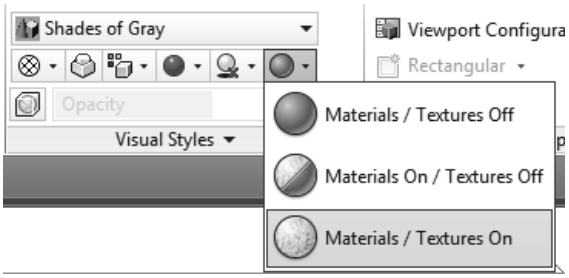


9. 

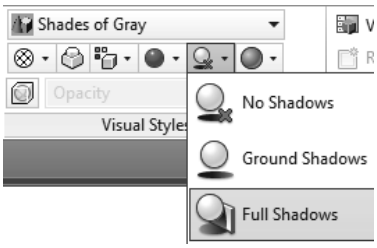
On the View ribbon,

Switch to a **Shades of Gray** display.

If your walls are reversed, you can change the orientation in the plan/top view.

10. 

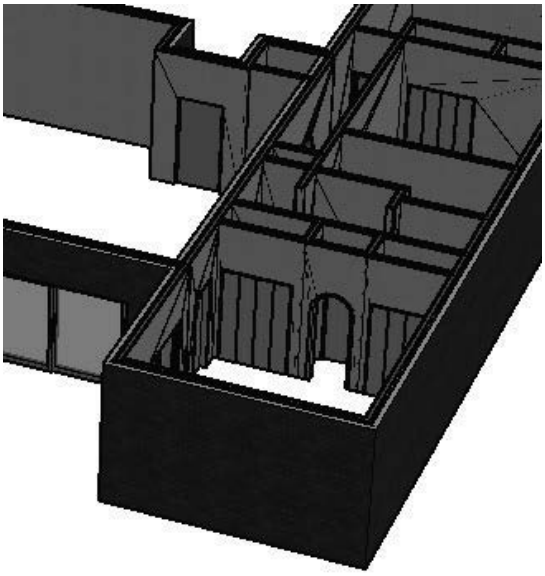
Set the **Materials/Textures On**.

11. 

Set to **Full Shadows**.

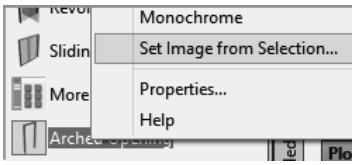
Note how the display changes.

When materials, textures, and shadows are enabled, more memory resources are used.

12. 

Locate the Arched Opening placed in the Master Bedroom.

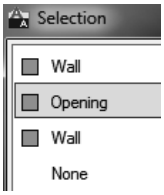
Hold down the SHIFT button on the keyboard and hold down the scroll wheel on the mouse to rotate/orbit the 3D model.

13. 

Select the **Arched Opening** icon on the tool palette.
Right click and select **Set Image from Selection…**
Pick the arched opening you created.
Press **Enter**.

A dialog box allows you to choose which object to use for the image selection.

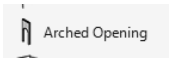
If you have Selection Cycling enabled, you will see a selection dialog box.



Select **Opening**.

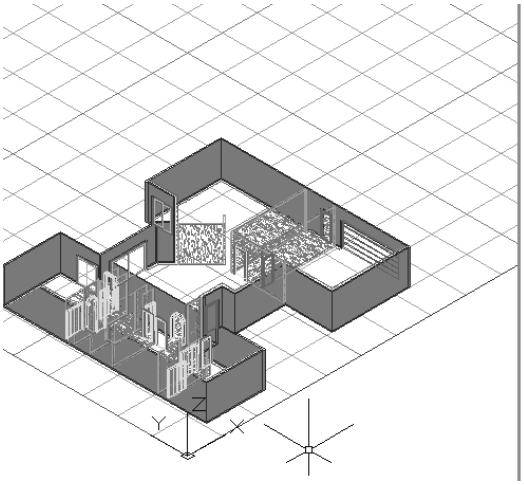
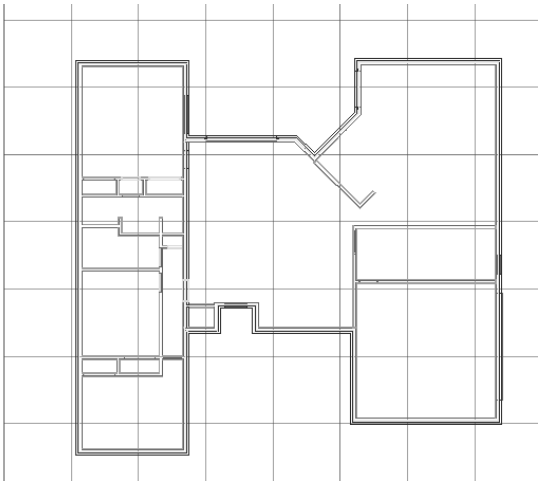
Press **Enter**.

You can select more than one object for your image selection.



The tool icon updates with the new image.

14. Select the Work tab to view your model. 

15. 


16. Save the file as *ex3-7.dwg*.

Exercise 3-8

Add Window Assemblies

Drawing Name: ex3-7.dwg
Estimated Time: 30 minutes

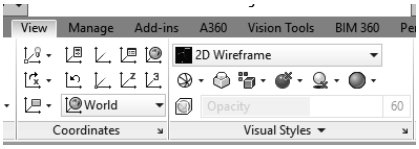
This exercise reinforces the following skills:

- Add Windows

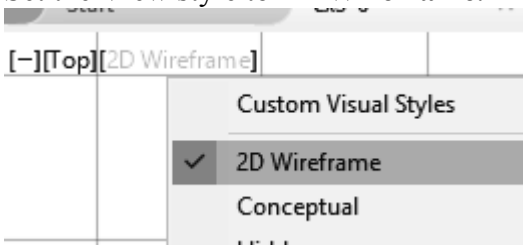
1. 

Open ex3-7.*dwg*.

Activate the Model tab.
Switch to a Top View.

2. 

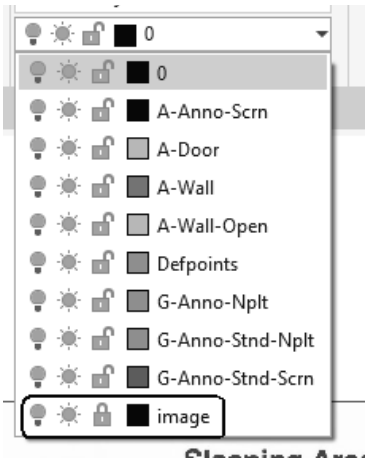
Set the View style to **2D Wireframe**.



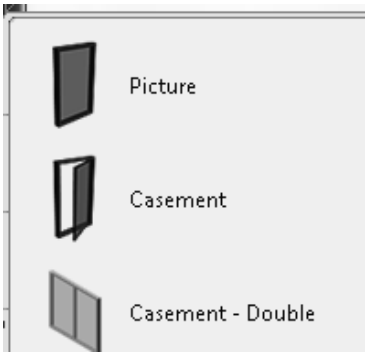
Remember you can change the view settings in the upper left corner of the display window.

3. 

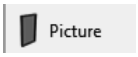
Activate the **Design Tools** from the Home ribbon, if they are not launched.

4. 

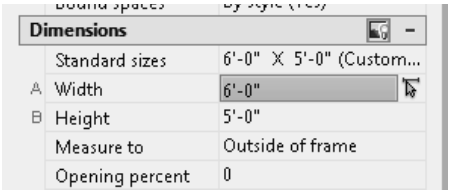
Thaw the image layer, so you can see the location of the windows.

5. 

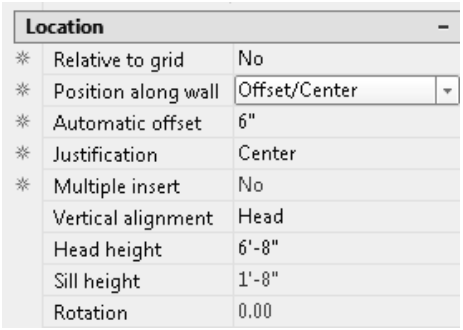
Select the Windows tab of the Tool palette.

6. 

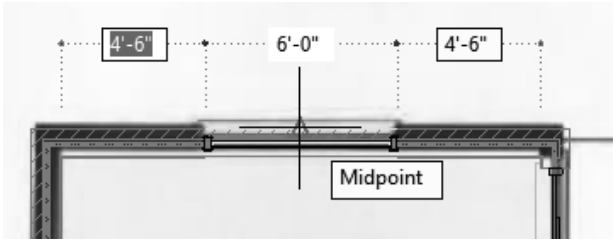
Select the **Picture** window.

7. 

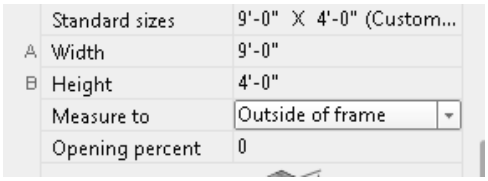
Expand the Dimensions section.
Set the size to **6′-0″ x 5′-0″**.

8. 

Expand the Location section.
Set the Position to **Offset/Center**.
Set the Automatic Offset to **6″**.

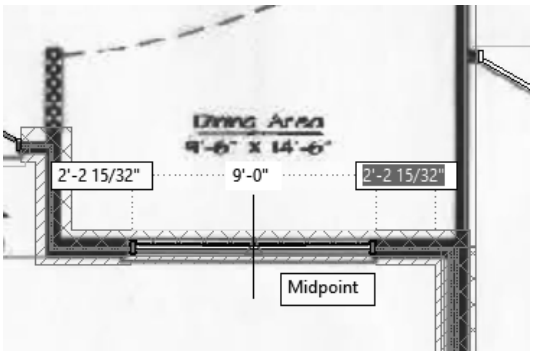
9. 

Select the midpoint of the north Master Bedroom wall.

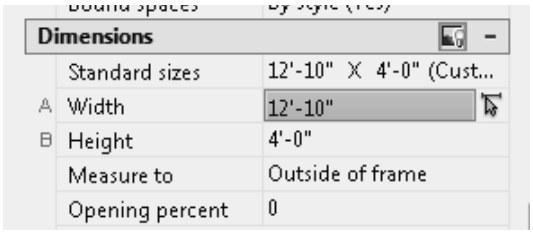
10. 

On the Properties palette, expand the Dimensions section.

Change the Width to **9′-0″**.
Change the Height to **4′-0″**.

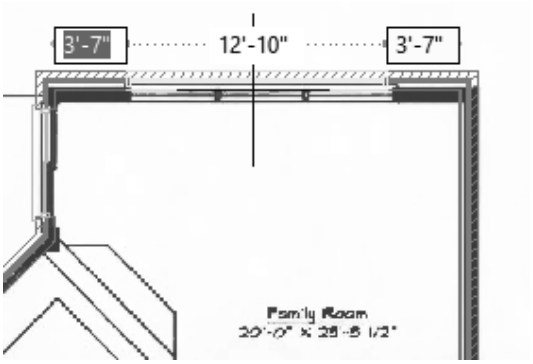
11. 

Place the window at the midpoint of the south wall in the Dining Area.

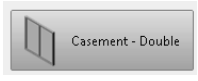
12. 

On the Properties palette, expand the Dimensions section.

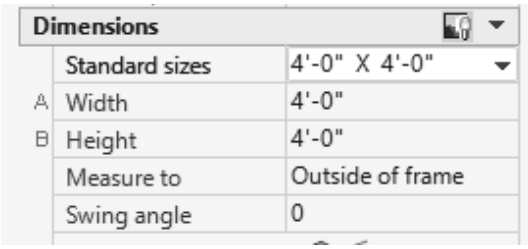
Change the Width to **12′-10″**
Change the Height to **4′-0″**.

13. 

Place the window at the midpoint of the north wall for the Family Room.

14. 

Select the **Casement - Double** window on the Windows palette.

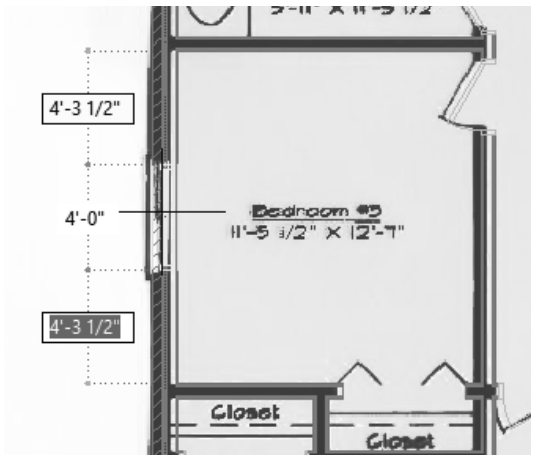
15. 

On the Properties palette, expand the Dimensions section.

Set the Standard size to **4′-0″ x 4′-0″**.

16. 

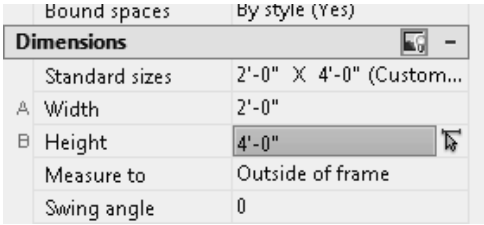
Place the window in the west wall of Bedroom #2.

17. 

Place the window in the west wall of Bedroom #3.

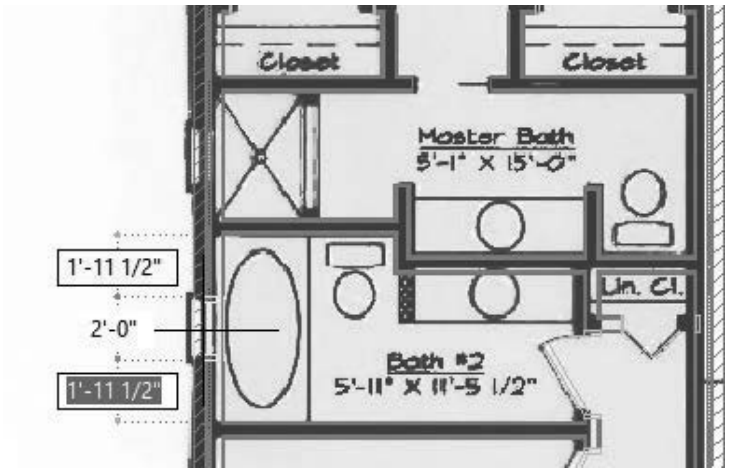
18. 

Select the **Casement** window.

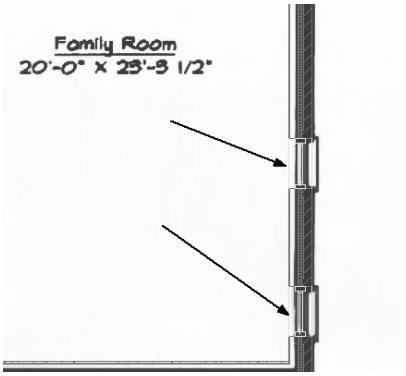
19. 

On the Properties palette, expand the Dimensions section.

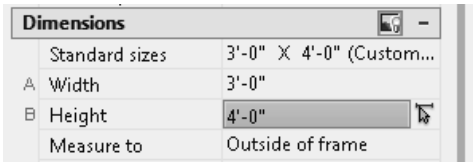
Change the Width to **2′-0″** .
Change the Height to **4′-0″**.

20. 

Place two windows on the west wall of the bathrooms.

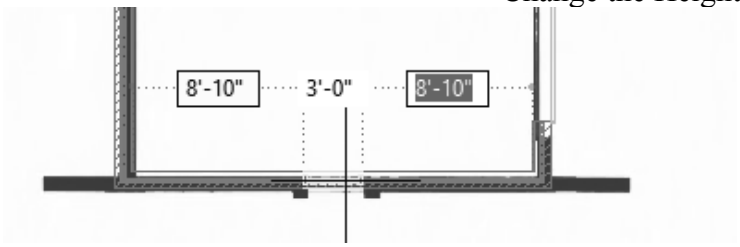
21. 

Place two windows on the east wall of the Family Room.

22. 

On the Properties palette, expand the Dimensions section.

Change the Width to **3′-0″** .
Change the Height to **4′-0″**.

23. 

Place the window in the south wall of the Garage.

24. Save as *ex3-8.dwg*.