Commercial Design

Using

AutoCAD® 2012

Introductory Level ◆ Tutorial Style ◆ Video Instruction

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Introduction to SketchUp

Lesson 4
Library Project: FLOOR PLANS – Part 2

In this lesson you will continue to develop your floor plan for the Campus Library project; in the previous chapter you drew the walls, doors, windows and columns/grids. Throughout this lesson you will be introduced to a few new commands and design concepts. Specifically, you will add stairs, elevators, toilet room fixtures and casework.

The image below is another reminder of what your plan will look like when you finish Lesson 5. Notice, again, the classrooms in the lower-right, the office area in the upper-left, the main toilet rooms in the lower-left, the public concourse across the top, and the check-out area in the middle.

It is important to remember that your drawings are to comply with the "office standards" outlined in Appendix A; this includes layer naming conventions, lineweight standards (which are based on the lines color), dimension and text standards, dimscale and ltscale settings, and abbreviations. As previously mentioned, this is intended to simulate a real-world office environment.
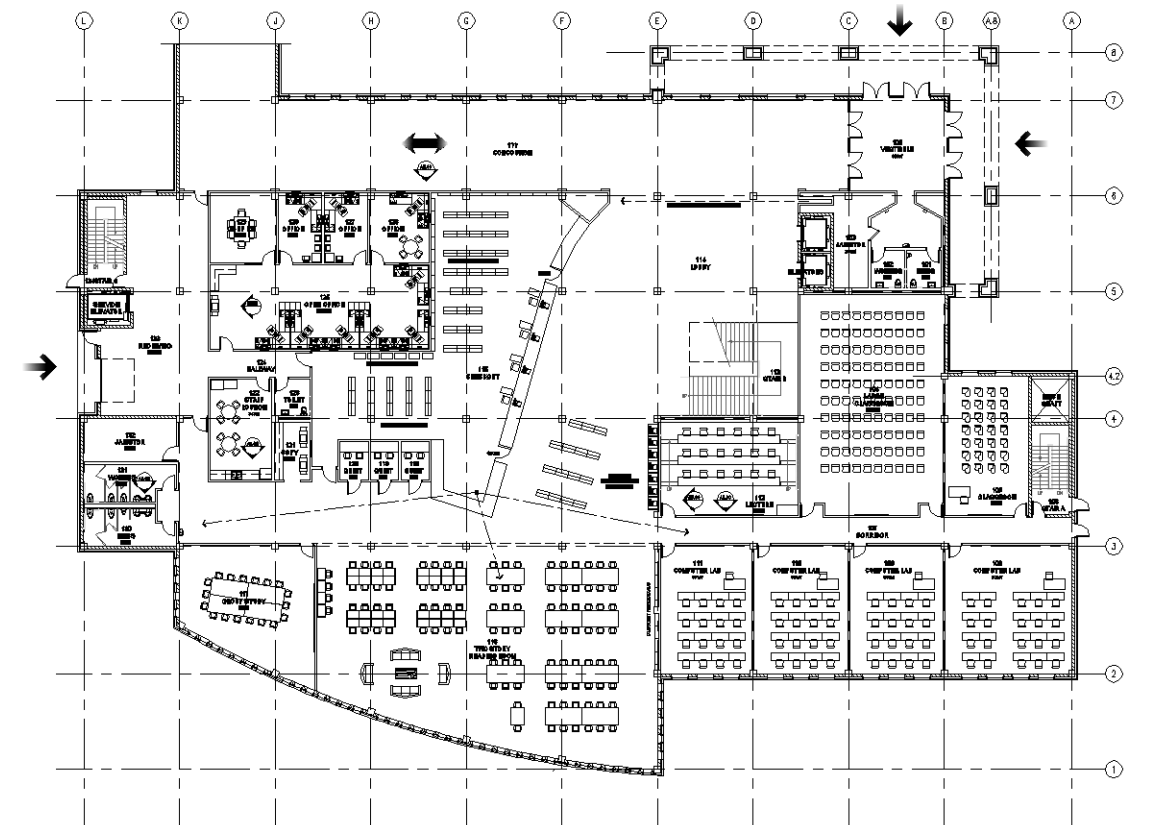
OVERVIEW: Example of what will be drawn in this book - First Floor Plan

Exercise 4-1:
Toilet Room Layout

Introduction

There are several important factors in laying out a toilet room. The primary consideration is typically accessibility; that is complying with local, state and federal accessibility codes so that people with various handicaps can easily access and use the toilet room facilities (or the entire building in general).

Other considerations include sight-lines. It is undesirable for a person in the hallway to see any of the toilet fixtures when the door is being opened by someone entering that space. It should be obvious that privacy (especially between males and females) should be expected in a toilet room design. Seeing the sinks (i.e., people washing their hands) is not too bad but the designer needs to make sure the sight-lines are not extended by the mirror above the sink. The design techniques employed to impede improper sight-lines often takes up a fair amount of floor space.

Another consideration has to do with the plumbing fixtures. It is important to have the correct type of fixture drawn and have it drawn the correct size. Some of the code requirements are based on the clear space in front of the fixture; thus, the fixture needs to be the correct size in order to verify compliance. Also, whether the fixture is wall-hung or a floor mounted tank-type fixture is important; the mechanical engineer needs to know (they specify the fixture in the Project Manual). If the toilet is wall-hung the wall needs to be thick enough to conceal the support bracket and the plumbing (the wall is even thicker when two toilets are back-to-back). From a Designer stand point, wall-hung toilets are often desirable in commercial buildings because they are easy to clean under and can be equipped with automatic flushing to help ensure a better "space experience" for everyone!

Downloading Content from the Internet:

In the next several steps you will get a better understanding of how you can get CAD content from the Internet to use in your drawings.

A word of warning before proceeding:

Do not assume all CAD content found on the Internet is worthy of using in your drawings. There are many locations on the web where individuals have uploaded CAD drawings that are less than perfect, so use caution. On the other hand, if you are downloading content from a product manufacturer's website, you can be fairly confident that they have accurately drawn their own product and want you to have a successful project using both their product and CAD files!

In this exercise you will be instructed on how to download toilets, sinks and drinking fountains from a plumbing manufacturer's website. The AutoCAD drawing files you download will be saved to your hard drive and then inserted using the Insert [block] command.

In an office setting you might want to save the downloaded plumbing fixture drawings to a "Plumbing Fixtures" folder on your hard drive for convenient access in the future.

You will need to have access to the Internet for the next several steps…

1. Open your Internet Browser; this book uses **MS Internet Explorer**.

Next you will be instructed to browse to a major plumbing manufacturer's website.

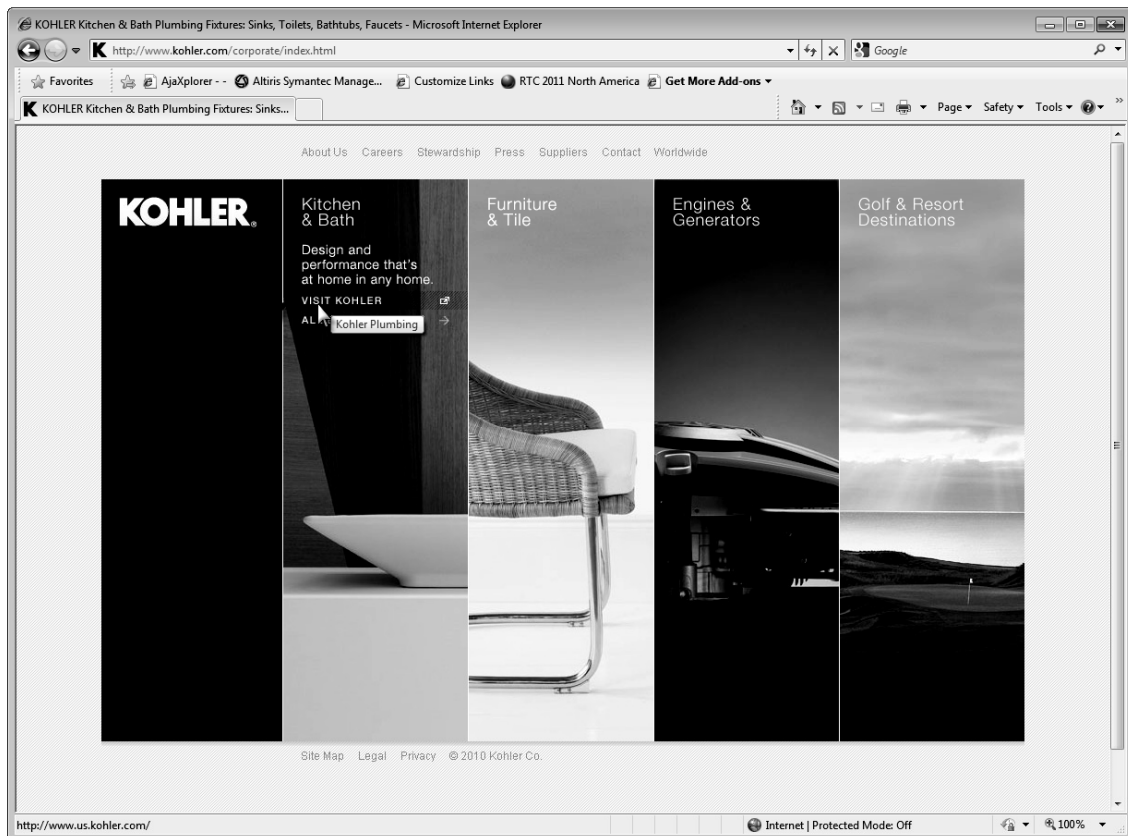2. Browse to the **Kohler** website by entering the URL **www.kohler.com** and then press **Enter**… *or click Go.*

FIGURE 4-1.1   Website: www.kohler.com

> **FYI:** *As you should be well aware, websites can change at any given moment. Companies often update their websites as new content becomes available or a fresh new look is desired. Even the model numbers change from time to time. So if the screen shots shown here are different than what you see on your screen you will have to interpret the steps based on what you see; you will likely still have access to the same content.*

3. Click on **Kitchen and Bath** and then click in the textbox next to *Search* at the top of the webpage; type **k-4329** and press **Enter**.

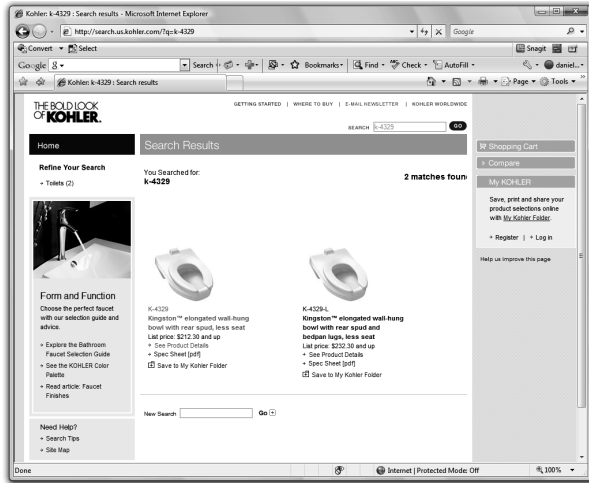4. Click directly on the toilet image (the one without the bedpan lugs) (Figure 4-1.2).

Take a minute to review the features of this toilet fixture.

5. Near the center-right of the page, click **For Installers and Designers**.

The previous step reveals specific design and installation information for the toilet (Figure 4-1.3).
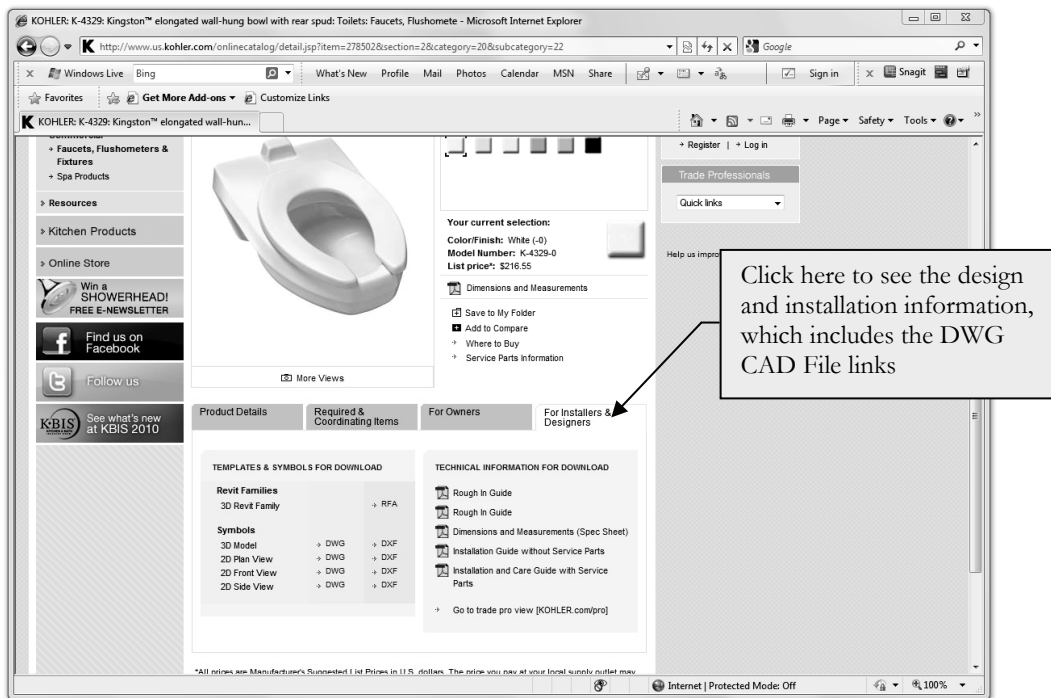
FIGURE 4-1.2   Website: www.kohler.com; search results

FIGURE 4-1.3   Website: www.kohler.com; downloading CAD Files

The next link you are instructed to click will allow you to save a CAD file of this fixture to your hard drive. If in a classroom setting, your instructor may direct you to save these files to a different location.

6. Under **Templates & Symbols for Download**, right-click **DWG** next to *2D Plan View* and then select **Save Target As…** from the pop-up menu.

Make sure you selected DWG CAD Files and not DXF CAD Files. The former is the native AutoCAD file format and the latter is a file format conceived by Autodesk to allow designers to share CAD information between AutoCAD and other CAD programs not written by Autodesk. The DWG file format is more readily inserted into your current drawing than DXF (**D**rawing e**X**change **F**ormat).

7. Click **Save** in the *File Download* dialog box (Figure 4-1.4a).

> ***FYI:*** *You may not get this prompt; if not, skip to the next step…*
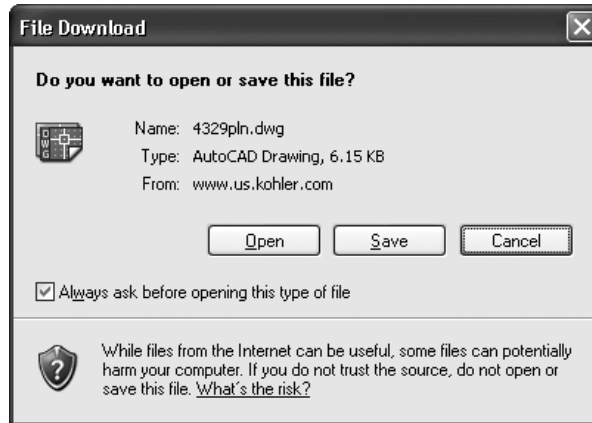

FIGURE 4-1.4A   Saving a file from the Internet

8. Browse to your **Documents** folder (Vista or Windows 7) or **My Documents** folder (Windows XP) and click **Save**; see Figure 4-1.4b.
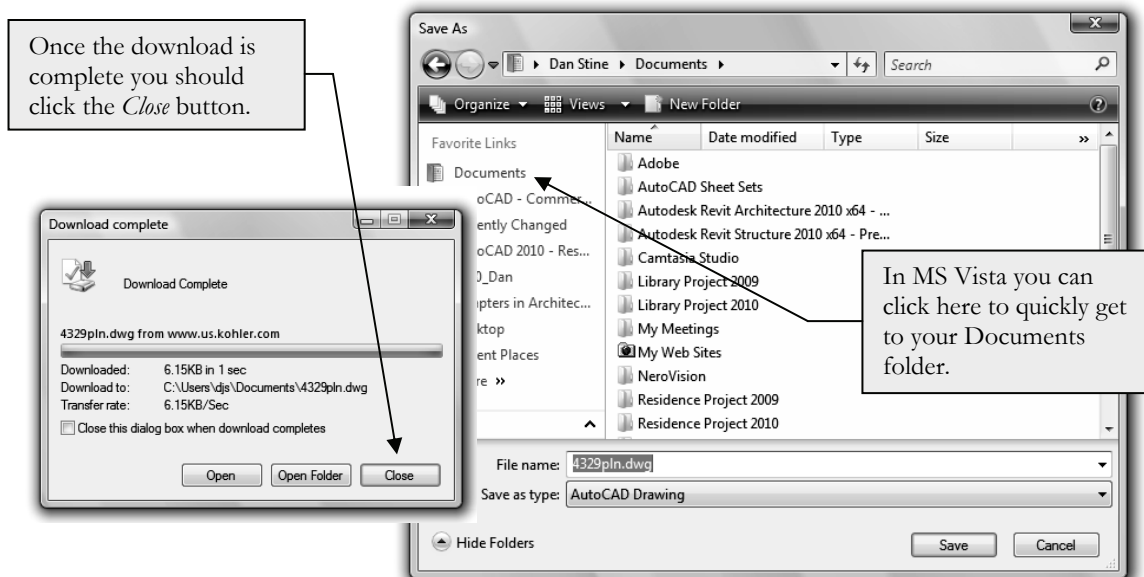

FIGURE 4-1.4B   Saving a file from the Internet

You now have a copy of the toilet fixture on your hard drive and it is ready to be placed in your floor plan!

The file you just downloaded is named 4329pln.dwg (unless you renamed it in the previous step); the name is the model number plus the view (pln for plan view in this case). If you open the file directly you will notice the origin has been conveniently located at the back/center of the fixture and all lines are on Layer zero. Having all lines on Layer zero is preferred; this way all lines in the *Block* will take on the properties of the *Layer* the *Block* is placed on.

Next you will be instructed to download the other fixtures required for your floor plan. Rather than giving you step-by-step instructions you will simply be given the model numbers; you can then find and download the other fixtures using similar techniques to those just covered.

9. Download the other two views (front and side) of the toilet.

10. Using techniques previously covered, download all three views (plan, front and side), from the Kohler website, for the plumbing fixtures listed below:
    - **K-2007 Kingston™ wall-mount lavatory**
    - **K-5024-T Dartfield™ Urinal**
    - **K-5250 Serra™ Drinking Fountain**

When finished you should have the following files listed in your **My Documents** folder:

- 5250sde.dwg
- 5250pln.dwg
- 5250frt.dwg
- 5024tsde.dwg
- 5024tpln.dwg
- 5024tfrt.dwg

- 4329sde.dwg
- 4329pln.dwg
- 4329frt.dwg
- 2007sde.dwg
- 2007pln.dwg
- 2007frt.dwg

Next you will draw a "lavatory system" from another major plumbing manufacturer called Bradley Corporation. You can also download this one from the Internet (and you will be given the URL), but the file is composed of multiple views and information, plus it is in a ZIP file, which makes for more work (as far as this tutorial is concerned).

11. *If you prefer to try the download*, browse to the following URL:
    http://www.bradleycorp.com/products/fixtures/lavsystems/ss/viewproduct.jsp?pgid=1196
    (This may change; see item "b" below.)

    a. Click the link to download the CAD Files.

    b. You can also search for Express Lavatory, Model SS-2N

12. In a new drawing, draw the *Lavatory System* shown in **Figure 4-1.5**; make sure the origin is at the back and centered.

    a. Approximate all dims and arcs not specified.
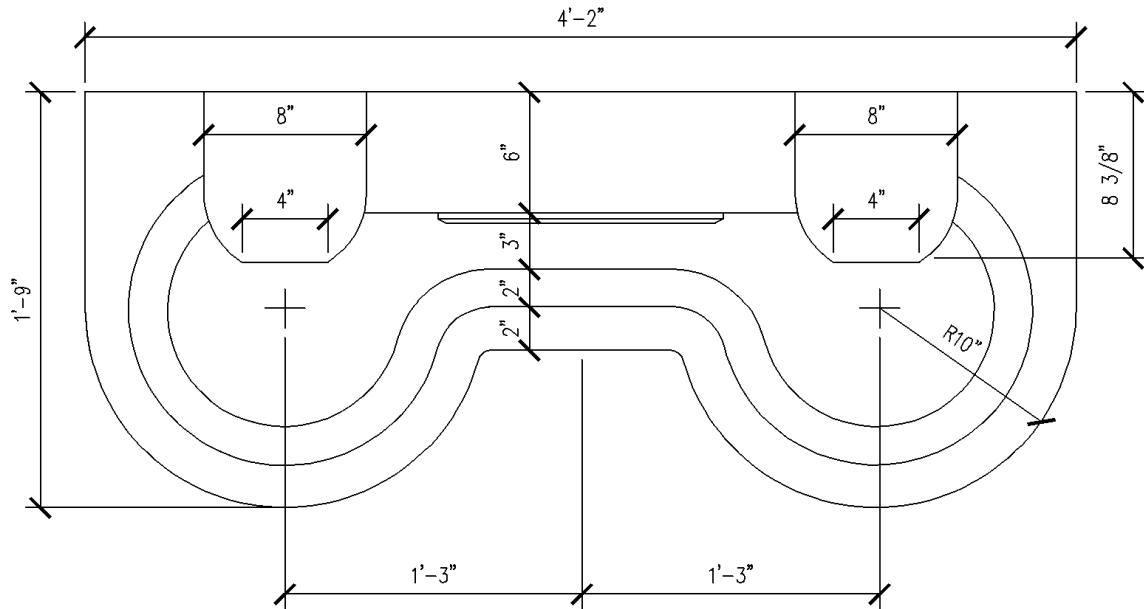
    b. Draw everything on *Layer* zero.

FIGURE 4-1.5   Draw this lavatory system in a new drawing file with origin centered on the back side

13. Save your drawing into the *My Documents* folder; name the file **Lav_System_pln.dwg**.

Your new drawing file is now ready to be inserted into the floor plan drawing when it is needed!

14. **Close** the lavatory drawing and **Open** your floor plan drawing.

You are now ready to add the plumbing fixtures to your floor plan. You will start with the small toilet rooms near the main entry.

15. Add the plumbing fixtures as shown in Figure 4-1.6, *plus*:

     a. Make sure the fixtures go on *Layer* **A-Mech-Pfix**.

     b. See **Figure 4-1.7a** for the grab bar dimensions.

     c. Draw the grab bars on Layer **A-Flor-Accs**.

     d. The room on the right has a toilet, sink and urinal.

     e. The room on the left has a toilet and a sink.

     f. Add a **drinking fountain** in the hallway.

     g. Do not draw the dimensions or the dashed lines.

     TIP: *Select* **Insert** *from the* **Insert** *tab, and then click the* Browse… *button. This will allow you to select AutoCAD drawing files from your hard drive to be inserted into the current drawing (onto the current Layer).*

The dashed lines shown in Figure 4-1.6 represent the clear floor space that must be considered when designing the layout of a toilet room. This tutorial will not get into the specifics related to the clear floor space at each fixture type; but, you may want to consider creating a special layer to place this information on so it can be turned off when not needed.

Another technique you might consider related to clear floor space is to add these dashed lines to your *Blocks*. You can leave the fixture on *Layer* zero and add the dashed lines on a specific *Layer*. That way, when the "clear floor space" *Layer* is turned off, the fixture will still be visible (as long as the fixture was not inserted on the "clear floor space" *Layer*, or any other *Layer* that is turned off). You will employ this technique in Lesson 5 when you create furniture and fixture symbols (i.e., Blocks).
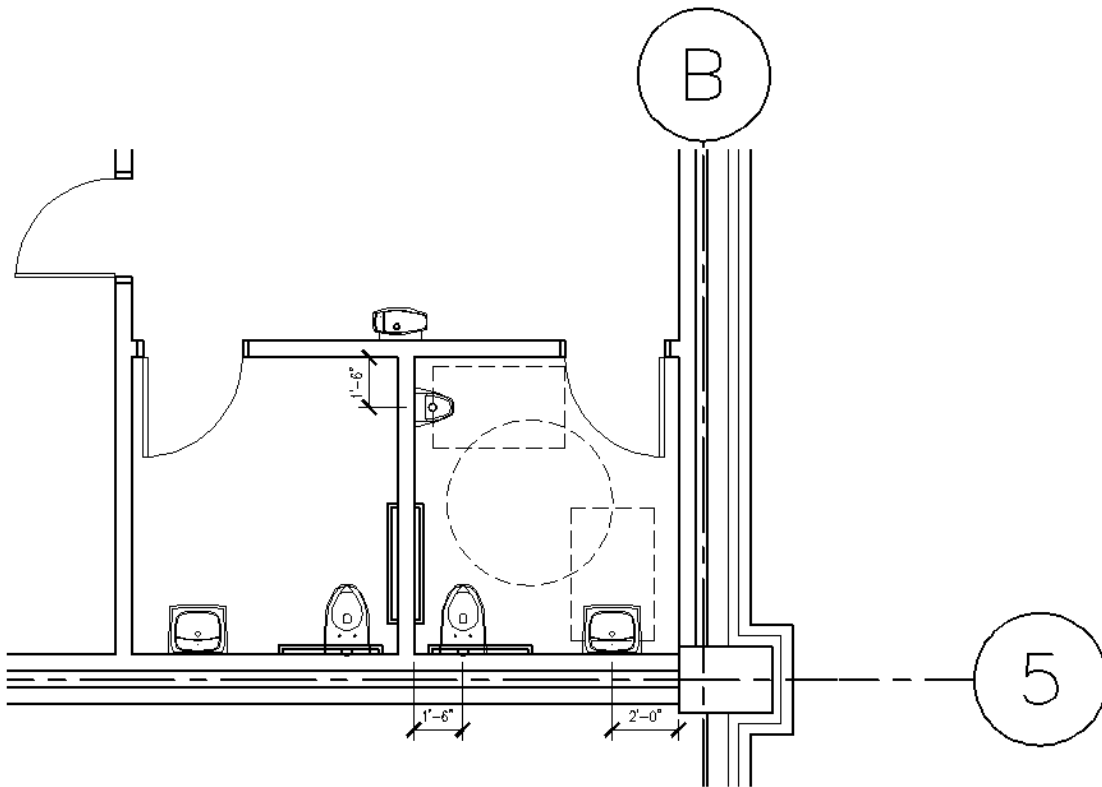
FIGURE 4-1.6   Place the fixtures shown (do not draw the dashed lines)

The sight-lines are not too bad here, considering the shape of the room outside the toilet rooms. However, the line of sight is not as critical in this situation because the toilet rooms are for single users. Most designers still prefer to ensure that plumbing fixtures are not visible from adjacent rooms, especially off of main entries and lobbies. In this case you created a small alcove-type space where a person needs to go out of their way to be in a position where the sight-lines matter; even a person walking straight towards the drinking fountain will not have any sort of vantage point towards the plumbing fixtures.
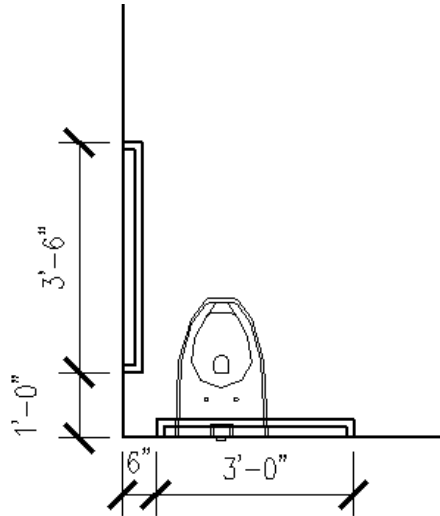
FIGURE 4-1.7A   Grab bar dimensions;
1 ½″ diameter pipe

FIGURE 4-1.7B   Grab bar picture
Codes vary by location; Minnesota requires a
vertical bar as shown above.

Drawing the Large Multi-User Toilet Room:

You will jump right in and place the plumbing fixtures and then you will add the toilet partitions and review the sight-lines from the adjacent hallway. You will also review the requirements for wall thicknesses behind the wall-hung toilets.

16. Insert the plumbing fixtures as shown in Figure 4-1.8, *plus*:

   a. Make sure the fixtures go on Layer **A-Mech-Pfix**.

   b. See **Figure 4-1.7a** for the grab bar dimensions; see Figure 4-1.9 for grab bar locations.

   c. The northern room has (3) toilets and a Lavatory System.

   d. The southern room has (2) toilets, a urinal and a Lavatory System (obviously this is the Men's toilet room).

Sight-lines are typically explored by drawing a line from the adjacent hallway (or space), through the door opening, into the toilet room. Looking at Figure 4-1.8 you can see the sight-lines are quite acceptable. As previously mentioned this design solution takes up a fair amount of floor space but is necessary.

An unacceptable design solution is shown in **Figure 4-1.9**. The toilet room is much larger and can even have another toilet fixture without the door modification for sight-lines; also, the door is right off the circulation path which can be problematic. Notice two lines are shown to visualize the full visual range. Granted, some of this view is obstructed by a person's body as they pass through the door opening; it is still an undesirable design solution.
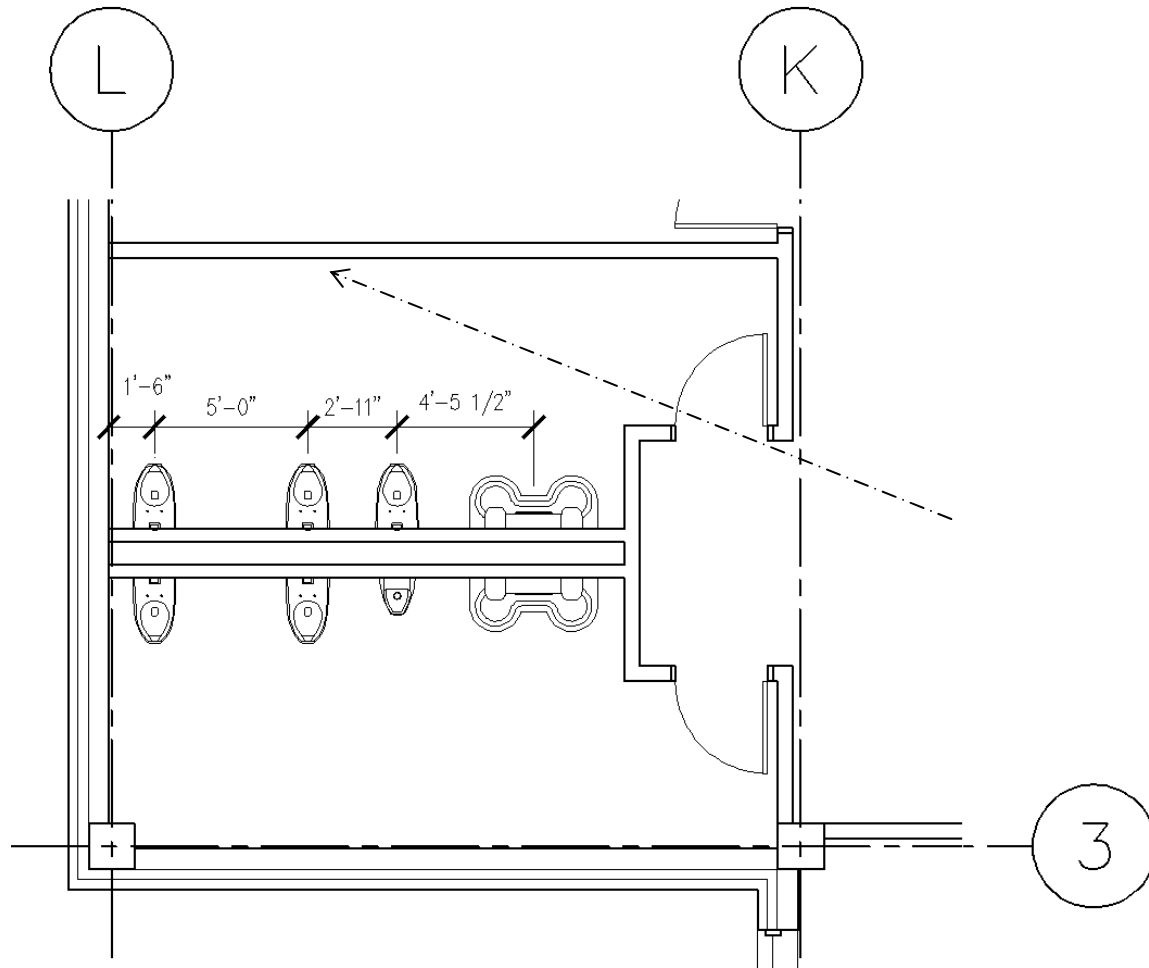
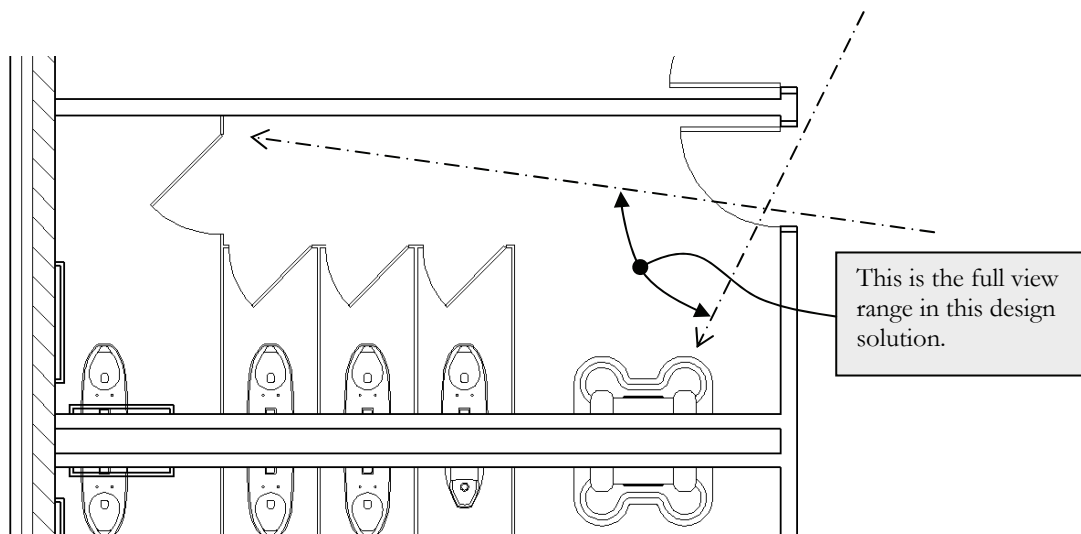**FIGURE 4-1.8**   Place the fixtures shown; dashed line shows sightline

This is the full view range in this design solution.

FIGURE 4-1.9   Dashed lines reveal unacceptable sightlines into the toilet room

Adding the Toilet Partitions:

The toilet partitions offer privacy for toilets and urinals. They come in a few styles and materials. Styles range from floor mounted to ceiling hung; the latter offers better access to cleaning the floors, like wall-hung toilets. Materials range from prefinished metal to Solid Phenolic Core (i.e., plastic) to stainless steel.

The divider panels, pilasters and doors come in various thicknesses. However, each is typically drawn 1″ thick and is dimensioned to the center of the panel so the thickness is not too important.

If you want to see images and more information on toilet partitions you can visit the Bradley Corporation website list below (select Tech data sheet PDF):
http://www.bradleycorp.com/products/mills/floor/viewproduct.jsp?pgid=673

The example to the left shows a floor mounted, overhead-braced toilet partition system.

Also notice the urinal screen at the end of the countertop.

Floor drains are usually positioned beneath a toilet partition so users do not have to walk over the slightly uneven surface.

Notice the accent floor tile that also takes into consideration the location of the toilet partitions.

Accessibility codes offer several layout options for toilet partitions. For example, if the door swings into the stall, more room is required in the stall to maintain the required clear floor space for the toilet fixture. Having a cheat-sheet of several different layout options is a big help. Consult your local code for specifics.

The preceding image is very similar to the Men's toilet room you are currently working on.

17. Draw the toilet partitions as shown in Figure 4-1.10, *plus*:

    a. Make sure the partitions go on Layer **A-Flor-Tptn**.

    b. Use lines and arcs to draw the partitions; show all **1″ thick**.

    c. Do not draw the dimensions.

    d. Draw a **36″ wide door** into the end stall (i.e., Accessible Stall).

    e. Draw **30″ wide doors** centered on the remaining stalls.

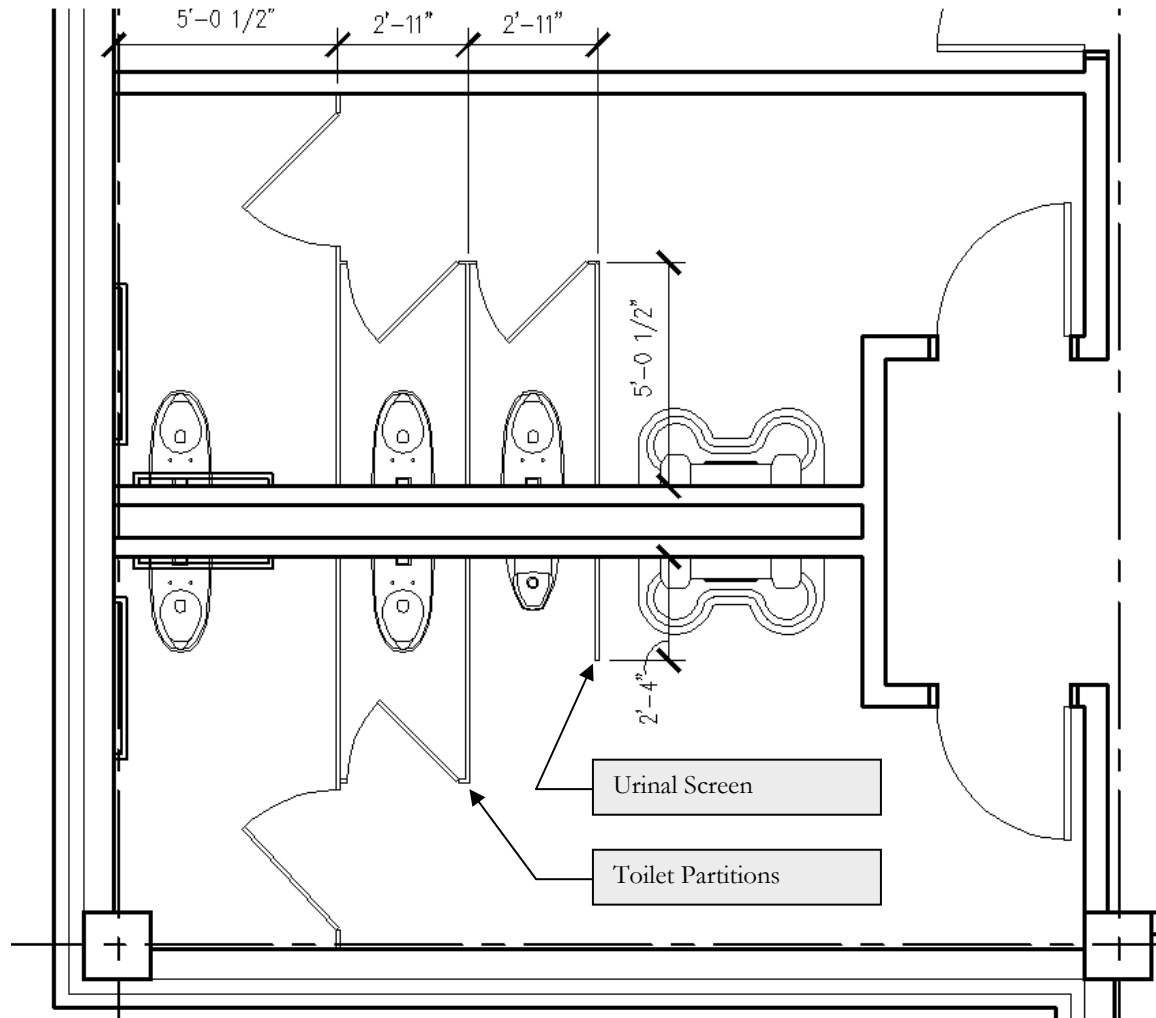   f. Draw the grab bars on *Layer* **A-Flor-Accs**.

FIGURE 4-1.10   Drawing the toilet partitions and urinal screen

18. Add a **drinking fountain** just to the east of the Men's toilet room, and centered on the wall, as shown in Figure 4-1.11.

For info on wall thicknesses behind double-hung toilets visit: **www.pdionline.org** and review the publication: *Minimum Space Requirements for Enclosed Plumbing Fixture Supports.*

This concludes the toilet room floor plan exercise. You will study this a little more in the toilet room interior elevations tutorial later in this book.
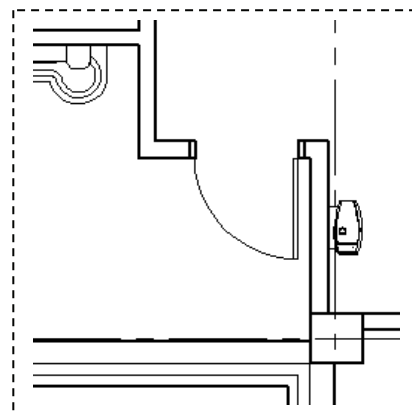

FIGURE 4-1.11   Drinking fountain centered on wall

Exercise 4-2:
Casework

Introduction

This exercise covers the basic techniques used to represent casework in plan. Casework is typically any built-in cabinets, countertops, desks, bars, etc. and is usually installed by a carpenter. This does not include systems furniture which is sometimes attached to the wall.

The architectural floor plans typically show the built-in items (i.e., casework) and the FFE Plan (furniture, fixtures and equipment) typically show the moveable items. The FFE Plans are covered in the next chapter.

The words "typical" and "usually" are used a lot because there is no exact science to how a set of drawings are put together. They can vary by country, state, city and even office.

First you will draw the casework in the open office area. These upper and lower cabinets represent the work area where copying and mailing occurs.

Work Area Cabinets:

Cabinets in a work area can vary quite a bit depending on the work being performed there. The picture below is similar to what you will be drawing next. The **base cabinets** are on the floor and are typically 24″ deep (but come in a variety of depths). The **wall cabinets** are attached to the wall and also come in various depths (12″ and 14″ being the most common).

As you can see the **electrical outlets** need to be coordinated with the electrical engineer; they need to be installed above the countertop and below the wall cabinets. When preparing the program, the designer (Architect or Interior Designer) should get a list of all the equipment required in each area. This will determine the number of outlets and locations. Often, items are overlooked or added later that can create an unsafe strain on the electrical system or require extension cords. For example, it is possible that the microwave shown in the image below was added by the users long after the design of the building; if the electrical system did not have enough capacity, it could make for an unsafe condition. If that were the case, a new outlet on another circuit would need to be added.

Notice two things about the wall cabinets: **1)** The cabinets have "**under-counter lights**" across the entire length. If this is desired by the client/designer, the electrical drawings need to be coordinated and the bottom of the cabinet recessed so the light fixture is not directly seen. **2)** The space between the top of the cabinet and the ceiling is filled in with studs and gypsum board for a clean, dust-free finish (not always in the budget).

Example of typical work room cabinets; see comments on previous page

1. Draw the casework shown in Figure 4-2.1, *plus*:

    a. Base cabinet lines on Layer **A-Case**.

    b. Wall cabinet lines on Layer **A-Case-Abov**.
        i. Make sure you set the linetype correctly.
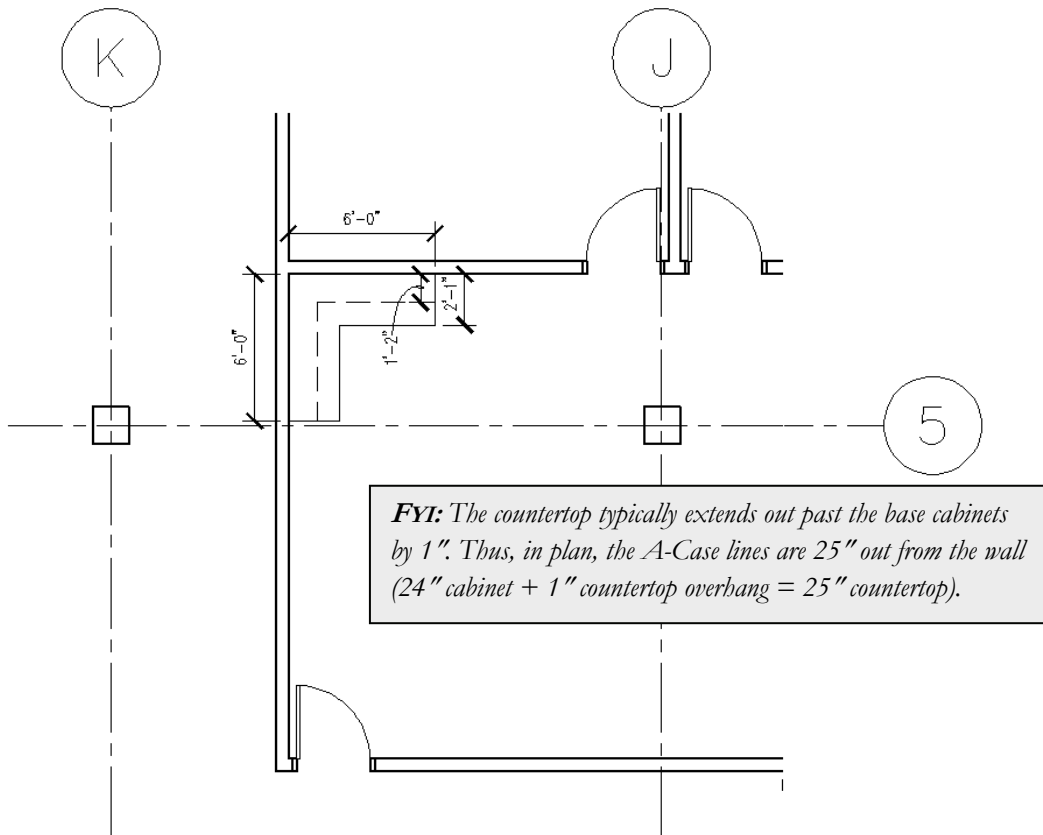
    c. Do not draw the dimensions.

> **FYI:** *The countertop typically extends out past the base cabinets by 1″. Thus, in plan, the A-Case lines are 25″ out from the wall (24″ cabinet + 1″ countertop overhang = 25″ countertop).*

FIGURE 4-2.1   Drawing the work area casework

Break Room Cabinets:

The cabinets in the break room have similar considerations as the work room cabinets. Additionally, you often have plumbing to coordinate as well (e.g., a sink or dishwasher). When drawing plans, these items are roughly placed and then more refined later with interior elevations, then the plans are updated.

The first thing you will do, to prepare for laying out the break room counter, is to draw a two-compartment sink.

2. In a <u>new</u> drawing, create the two compartment sink as specified below (save to your *My Documents* folder):

filename: **Sink-1.dwg**
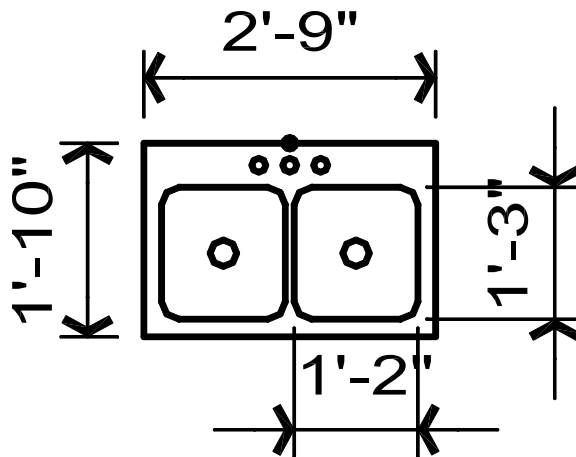
Draw this sink per the following specifications:

- o 2″ space (i.e., offset) at sides and front.
- o 3″ Dia. Circles centered in sinks.
- o 2″ rad. for *Fillets*.
- o 1½″ Dia. at faucet spaces; 3 ½″ apart.
- o Black dot = *Origin*
- o All on *Layer* zero.

3. Draw the cabinets shown in Figure 4-2.2, *plus*:

   a. The wall cabinets extend the full length of the room (14′-6″).

   b. The 3′-0″ space will accommodate a refrigerator.

   c. The countertop is at two heights; the sink area is lower for handicap accessibility (covered more with interior elevations).

   d. Add the two-compartment sink drawn in the previous step.

   e. Ensure the sink is placed on the correct *Layer (**TIP:** Plumbing)*.

   FYI: *The wall cabinets are shown with dashed line work in plan because they are assumed to occur above the floor plan cut plane. This also helps to differentiate between wall and base cabinets (the dashed line is controlled by the Layer).*
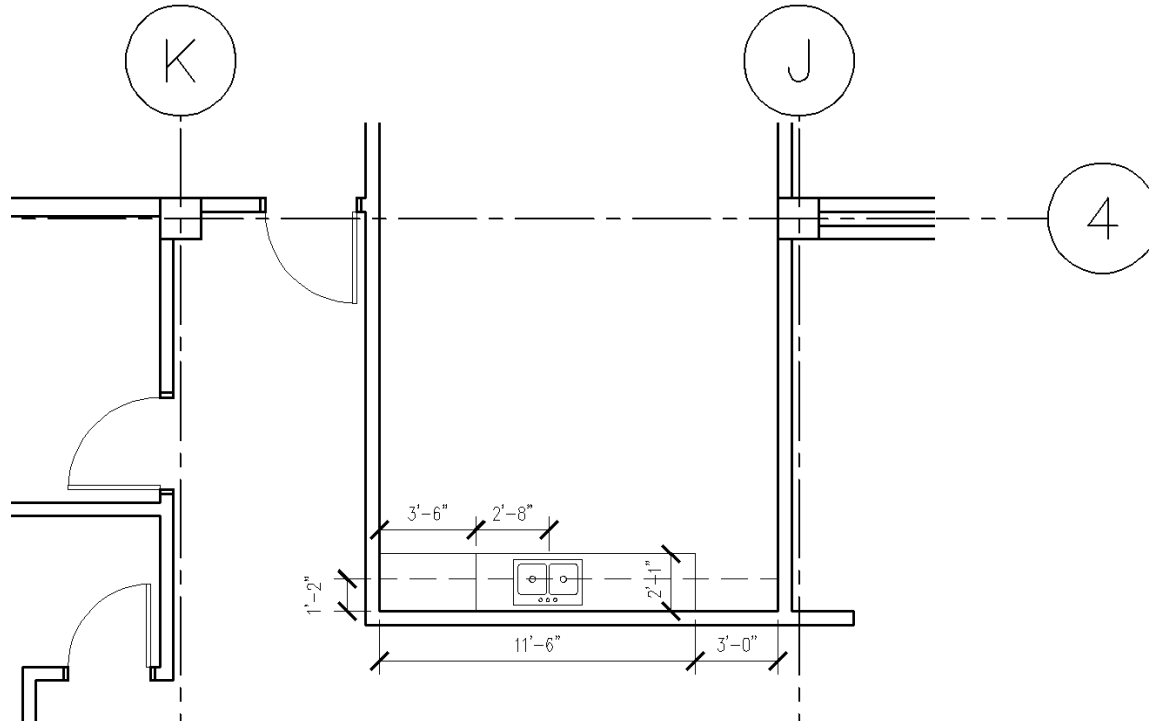
FIGURE 4-2.2   Drawing the break room casework

4.   Draw the cabinets shown in Figure 4-2.3, *plus*:

   a.   The wall cabinets are 14″ deep.

   b.   The countertop is 25″ deep.

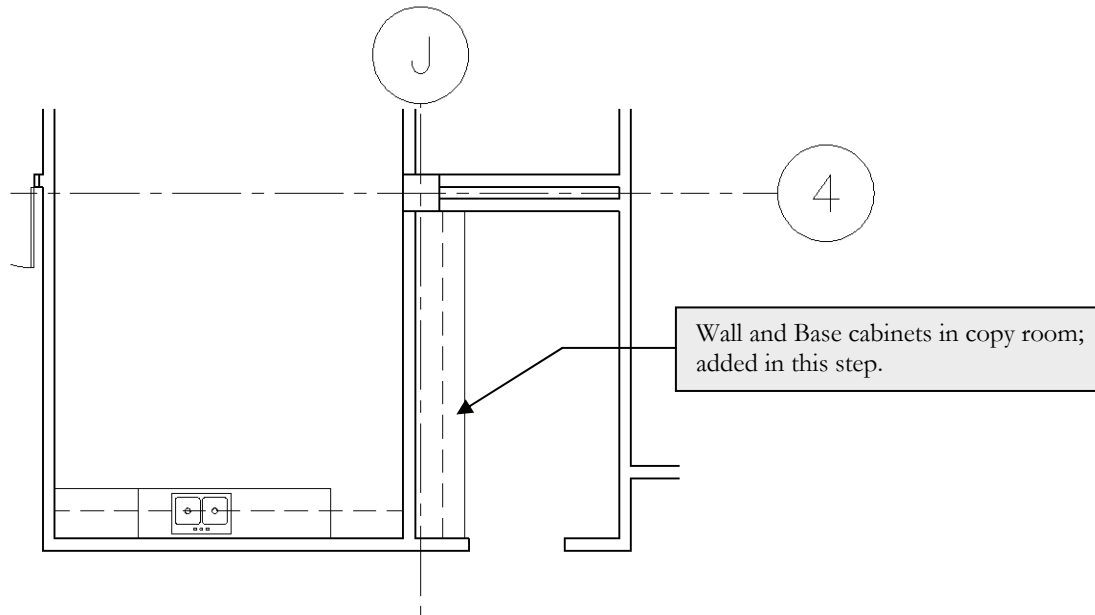Wall and Base cabinets in copy room; added in this step.

FIGURE 4-2.3   Drawing the copy room casework

Checkout Counter:

In the previous steps you placed base and wall cabinets, now you will design the checkout counter. The checkout counter is what is referred to as "custom casework." The base and wall cabinets can also be "custom casework" or they can be ordered from a catalog (the latter being the less expensive option).

Basically, "custom casework" is anything a local cabinet/woodworking shop would build. Typically built in their shop and assembled on-site.

Custom casework gives the designer a wide range of functional and aesthetic opportunities. As you can see in the Figure on the next page (Figure 4-2.4), the angles and curves require a custom built solution; these shaped cabinets are not found in a catalog of standard cabinets.

The cost associated with custom casework is, of course, higher than standard stock items. When the client can afford custom, they have the opportunity to get a more functional space in which to work. For example, a drawer can be located wherever it is needed and a cubby can be made just the right size to hold the companies "odd" sized shopping bags (which make for better use of space and keeps the bags stacked neatly).

The checkout counter represents a drafting exercise where you have to draw various angles and curves per the given instructions. It is easy to draw linework in AutoCAD that kind of looks like what it should be, but it is the designer/drafters responsibility to draw things accurately so things go smoothly during construction. This type of structured drafting, no matter if on your own time or in a classroom setting, will make you better prepared and more efficient in the workplace. Your instructor may have you print the checkout counter to scale and check it with an accurate drawing on transparence paper.

5. Draw the checkout counter shown in Figure 4-2.4a, *plus*:

   a. Draw all linework on **A-Case** layer.

   b. The countertop is **36″** deep.

   c. The doors (i.e., gates) are **36″** wide.

   d. The exact location of the gates does not matter (visually close).

   e. Do not draw the dimensions.

   f. Trim the curved line at grid 5 and then draw the longer angled line by "connecting-the-dots"; see Figure 4-2.4b.

      i. Select the line and use Properties to determine the length and angle (i.e., the "???" dimensions shown).

   g. Notice the radius for the curved portion of the counter matches the radius of the adjacent curved wall previously drawn; the casework line is held back slightly from the face of the wall.

*TIP: Draw one side of the counter and then use **Offset** to create the other side.*
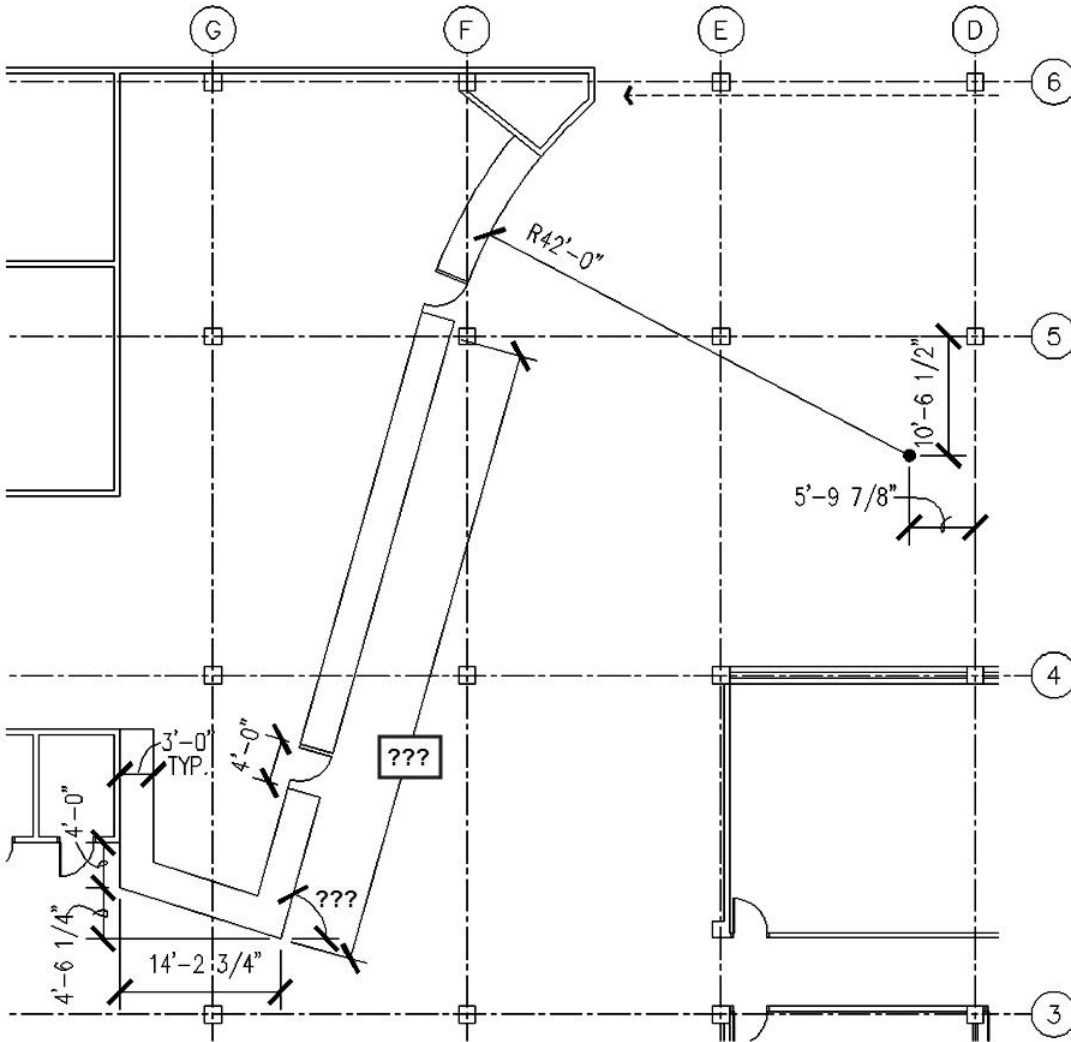
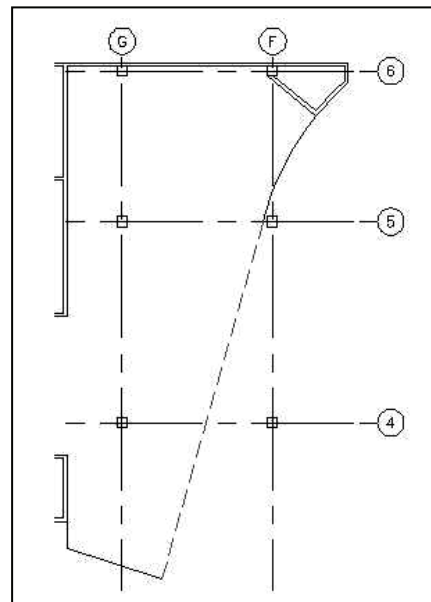**FIGURE 4-2.4A**   Drawing the checkout counter casework

FIGURE 4-2.4B   Drawing last main line

Thinking about sightlines again, looking at Figure 4-2.5, you can see the sightlines that have been added show how the design of the counter enhances the Librarian's ability to monitor the adjacent spaces.
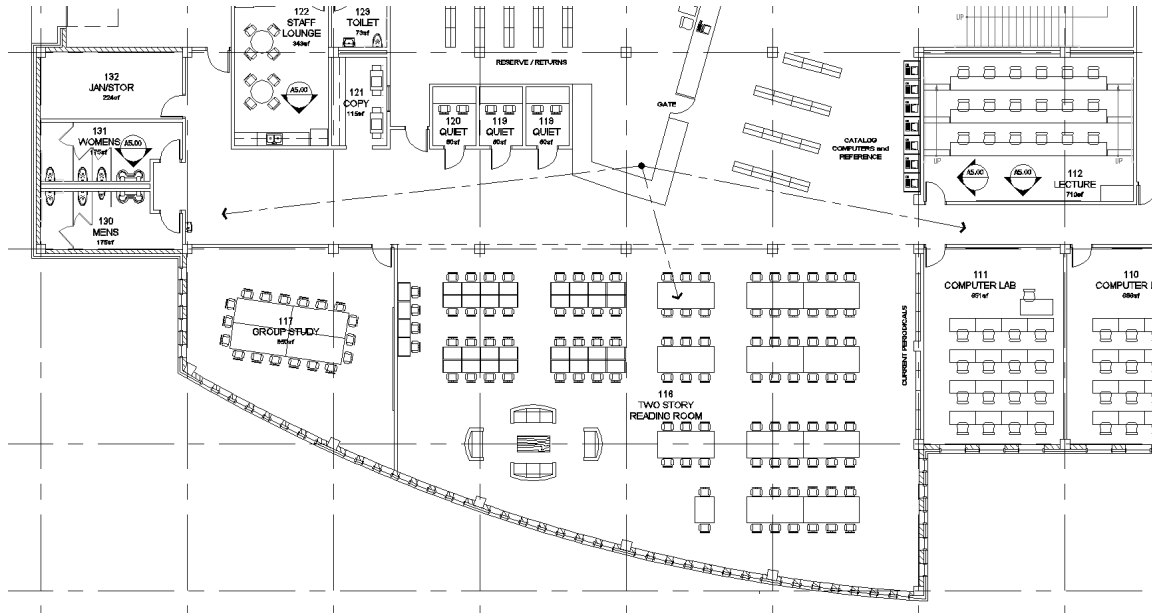

FIGURE 4-2.5   Reviewing sightlines associated with the checkout counter

CHECKOUT COUNTER EXAMPLE   Second floor view showing gate and accessible checkout area with lower countertop.

Exercise 4-3:
Stairs and Elevators

Introduction

In this exercise you will add the stairs and elevators. There are several things to consider when drafting and designing these components within a building. Similar to the plumbing fixtures, you will download the elevator drawings from the internet.

Adding the Passenger Elevators:

Elevators come in several models and sizes. In this tutorial you will be adding two passenger elevators and a service elevator. Selecting the model and size depends on several factors such as: expected number of passengers in a given period of time, number of floors served, budget and speed to name a few.

In this made-up library project, the passenger elevators will have high quality finishes and are intended primarily for people (i.e., the public and staff) and book carts. The service elevator is only accessible by staff and has durable finishes to withstand large items being moved in and out on a regular basis.

The following steps could aid in determining the elevator shaft size. However, this information was previously given when you drew the walls.

Again, you will need access to the Internet before proceeding with this exercise.

1. Open your Internet Browser; this book uses **MS Internet Explorer**.

Next you will be instructed to browse to a major elevator manufacturer's website.

2. Browse to the **ThyssenKrupp Elevator** website by entering the URL **www.thyssenkruppelevator.com** and then press **Enter** (Figure 4-3.1).

3. Click the **Architect Direct Pro** link near the top of the webpage.

4. Now select the **View All Models** link (i.e., a link on the far left).
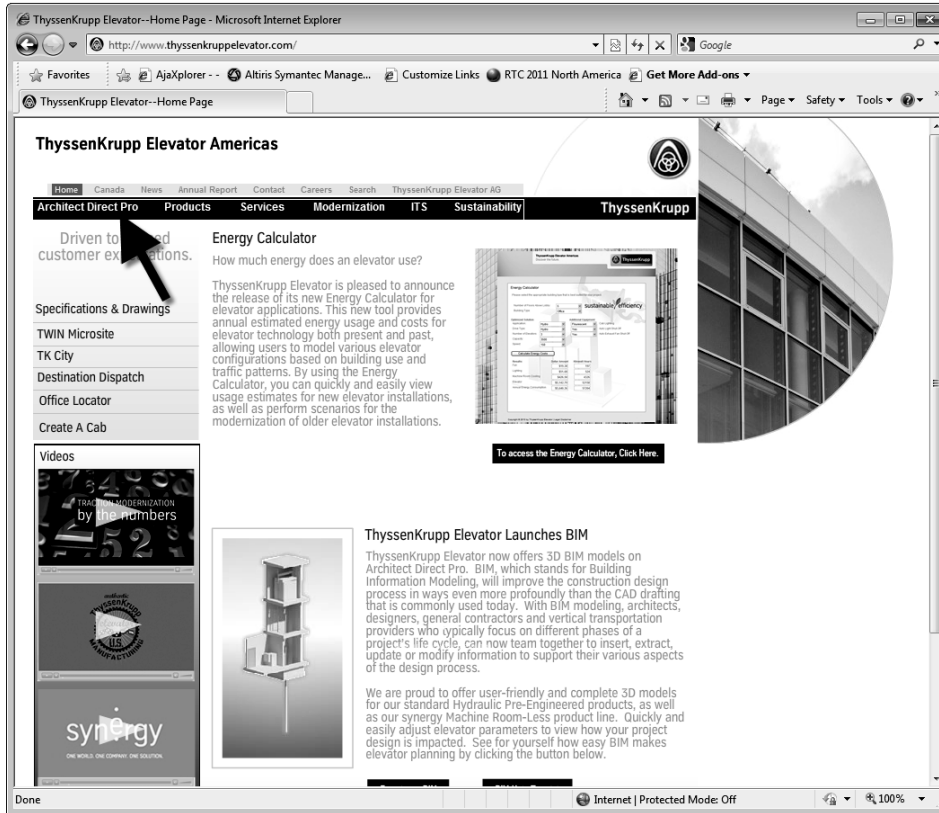
FIGURE 4-3.1   Elevator manufacturer's website

5.   Scroll down and select **Gearless – 3000 lb. Capacity** (Figure 4-3.2):

Capacity	Oildraulic		synergy Machine Room-Less						Traction	
	AMEE	Conventional	85S	100R	100S	300R	300S	300E	Geared	Gearless
2000	◉									
2100	◉	◉	◉		◉			◉		◉
2500	◉	◉	◉	◉	◉	◉	◉	◉		◉
3000	◉	◉	◉	◉	◉	◉	◉	◉		◉
3500	◉	◉	◉	◉	◉			◉		◉
4000	◉	◉				◉		◉	◉	◉
4500										

FIGURE 4-3.2   Elevator manufacturer's website

6.   Click the **icon** under the label *Drawings/non-seismic* (see image below):

Model:	Type:	Data:	Drawings:		TK Specs:	BIM Models:
			non-seismic	seismic		
Gearless 30	Gearless	🖼	📝	📝	🗐	B
SPF 30	Gearless	🖼	📝	📝	🗐	B

Click here

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7. Right-click the DWG icon next to **350 - Center Opening - Front - Hoistway & Machine Room View** as shown in Figure 4-3.3.
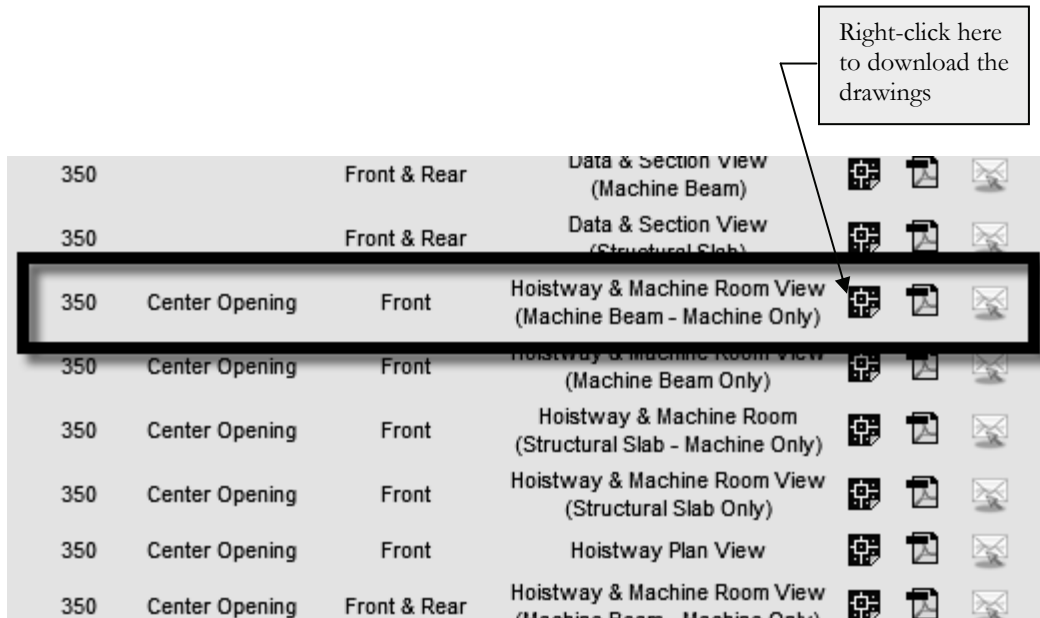

FIGURE 4-3.3   Elevator manufacturer's website

8. Click the **Save Target As…** command (Figure 4-3.4) and browse to your *Documents* or *My Documents* folder.

FIGURE 4-3.4   File Download dialog

You now have an AutoCAD drawing file named **PMD043_hm 1 machine mb.DWG** saved on your computer's hard drive. This drawing is shown in Figure 4-3.5A, and is packed with information. As you can see, details about the elevator shaft and the elevator machine room are given. In your case, this is more information than you need. So, you will open the drawing and Copy/Paste what you need into your floor plan.
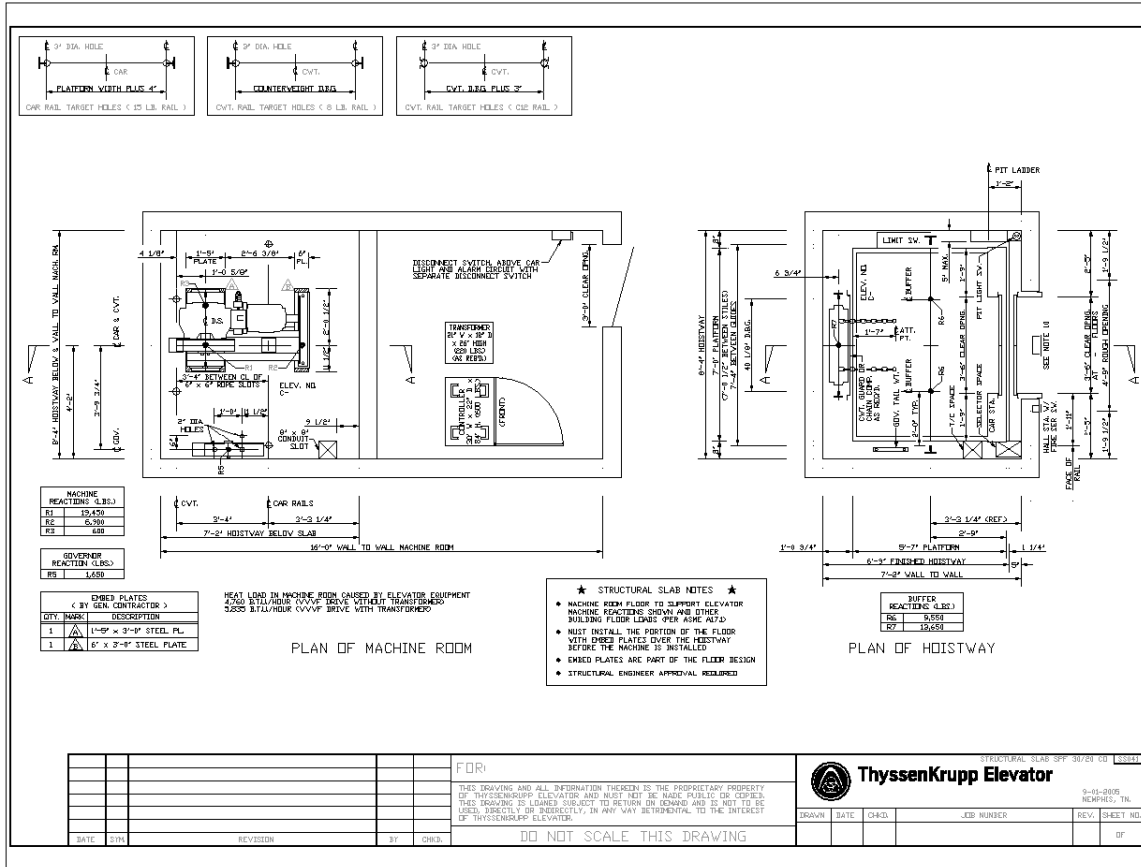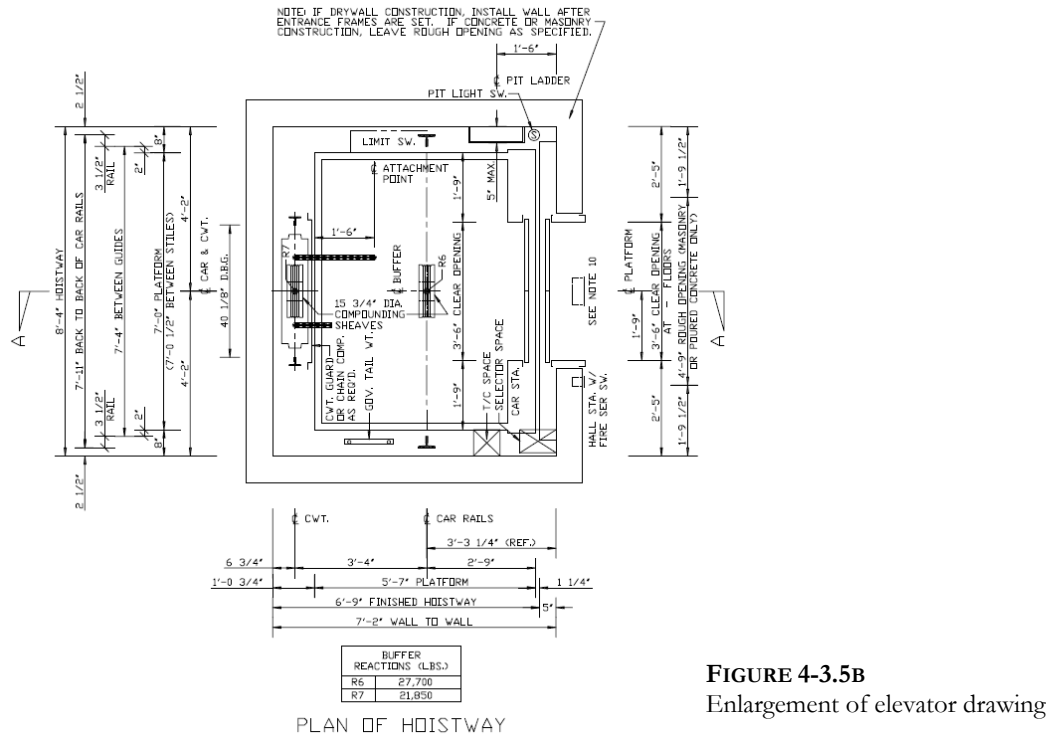
FIGURE 4-3.5A   Contents of drawing file just downloaded

FIGURE 4-3.5B
Enlargement of elevator drawing

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9. Open **PMD043_hm 1 machine mb.DWG** (i.e., the elevator drawing just downloaded).

10. **Zoom** in to the elevator shaft plan view on the right.

Layer Freeze: a useful tool:

Next you will use a tool to freeze a *Layer* just by selecting objects on the screen. This will help you to select just the parts of the drawing you need.

11. Set the current *Layer* to **0** (i.e., zero).

> ***TIP:*** *Click the Layer drop-down list from the* **Home** *tab and scroll up to Layer zero and click on it; as long as nothing in the drawing is selected, this will make the selected Layer current.*

12. From the **Layers** panel on the **Home** tab, select the **Freeze** icon (see image to right).

> ***TIP:*** *Explode (on the* Modify *panel) any* Blocks *in this drawing so you can control the* Layer *color when it is loaded into the library floor plan.*
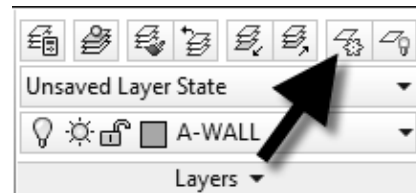
13. Click on all the text, dimensions and centerlines until the drawing looks like Figure 4-3.6.

> ***TIP:*** *If you click on the wrong object and a Layer is frozen by mistake, type* **U** *and press* **Enter** *on the keyboard. (This is not the main Undo command.)*
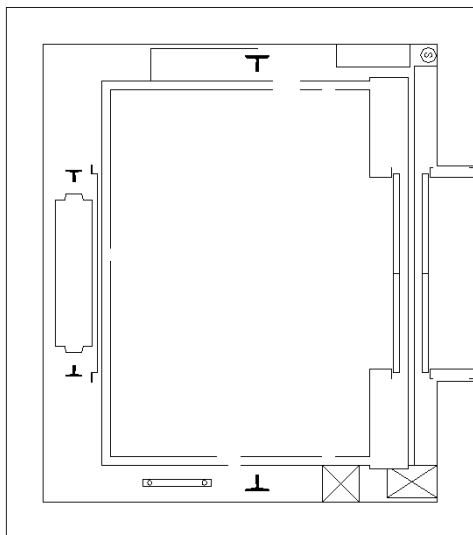

The elevator drawing is almost ready to be copied to the clipboard and pasted into your floor plan.

Before you copy the drawing to the clipboard, you will fix the broken lines (they were trimmed to accommodate notes and dimensions – which are now frozen).

Also, all the visible linework is currently on a *Layer* named "Object" which does not conform to your office standards; you will fix this too.

FIGURE 4-3.6   Elevator drawing

Using the Join Command:

The join command allows you to select two or more aligned lines and turn them into a single line. You will try this next.

14. Select **Join** from the extended portion of the **Modify** panel, on the **Home** tab.

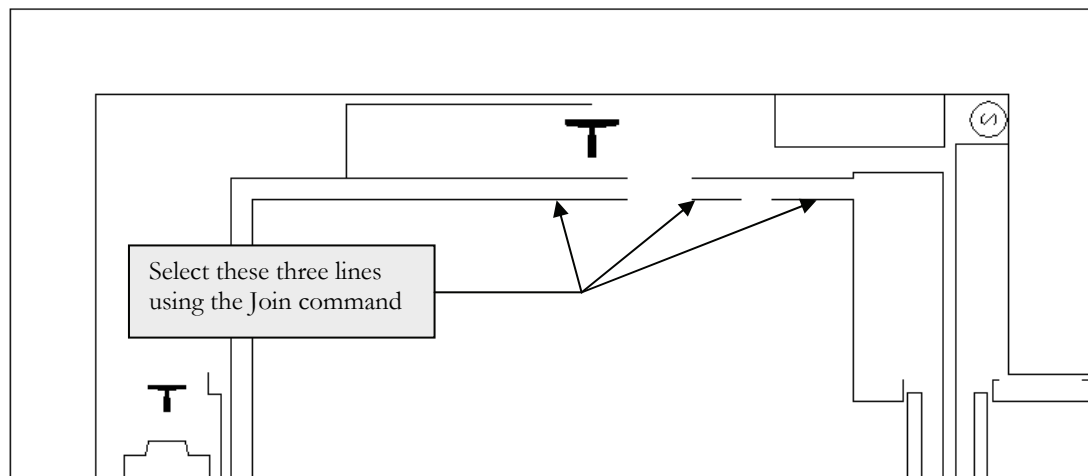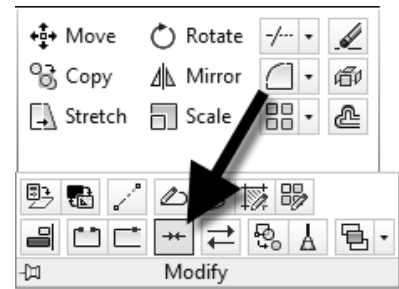15. Select the **three** lines identified in **Figure 4-3.7** and then press **Enter**.

Select these three lines using the Join command

FIGURE 4-3.7   Elevator shaft drawing

16. Continue to use the **Join** command to cleanup all three sides of the elevator car as shown in Figure 4-3.8.

In the next step you will change all the linework to *Layer* zero before you copy/ paste into your floor plan. If you did not do this the *Layer* named "Object" would be created in your floor plan drawing. These types of extra *Layers* are not desirable.

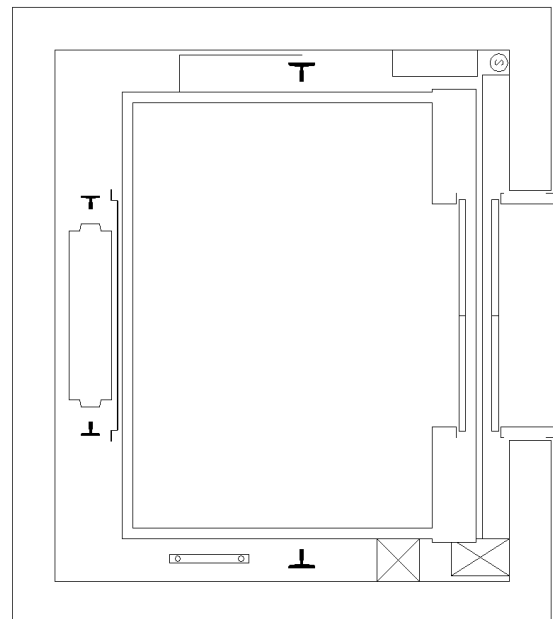17. Select everything visible in Figure 4-3.8 and change its *Layer* to **0** (i.e., zero).

FIGURE 4-3.8   Elevator shaft drawing

Next you will mirror the elevator to align the orientation with your plan.

18. **Mirror** the elevator as shown in Figure 4-3.9.

Copy with Base Point:

Next you will *Copy* the elevator to the MS Windows Clipboard. This is a placeholder for information (it can be used within the same application or between programs, e.g., Copy from AutoCAD and Paste into MS Word).

FIGURE 4-3.9   Elevator mirrored

AutoCAD offers the ability to specify a *Base Point* before placing the drawing information into the Clipboard. Thus, when you *Paste* the drawing information back into the same drawing or another drawing you can accurately place it.
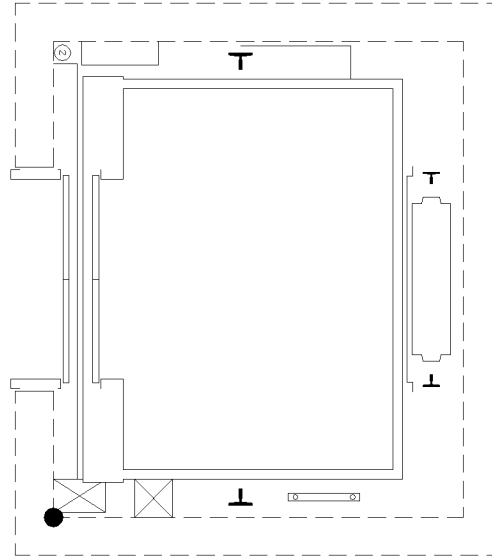
19. Type **copybase** and then press Enter *(command not on the Ribbon)*.

You are now prompted to select a Base Point:

20. **Pick** the point identified by the **black dot** in Figure 4-3.9 using OSNAP's.

*Typing command with Dynamic Input toggled on, near cross chairs.*

You are now prompted to select items to copy to the clipboard:

21. **Select** everything in Figure 4-3.9 except the walls which have been shown dashed for clarity (you already have walls in your plan).

> ***TIP:*** *You can use a crossing-window to select everything and then hold down the Shift key while selecting the wall lines (which will remove them from the selection set).*

22. With everything but the wall lines selected, press **Enter**.

The elevator has now been copied to the clipboard. That information will remain there until the computer is turned off or AutoCAD (or any other program) copies new information to the clipboard.
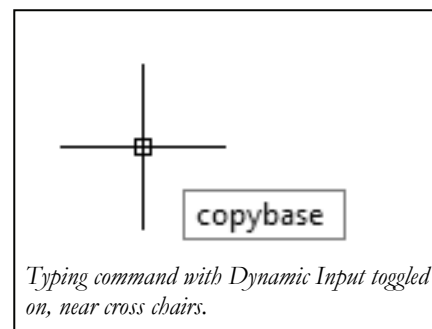
TRY THIS:

While the drawing data is still in the clipboard, try opening a word processor like MS Word and select Paste from the Home tab on the Ribbon. Notice how the drawing looks in the document (also notice the down arrow and paste special).

Switch back to your library floor plan.

23. **Zoom** in on the elevator shaft near the main entry.

24. From the **Clipboard** panel, select the **Paste** icon (or Ctrl + V).

You should now see a ghost image of the elevator attached to your cursor. The *Base Point* previously select is now the insertion point.

25. Select the same, relative, location as the insertion point (shown as a black dot in Figure 4-3.10).
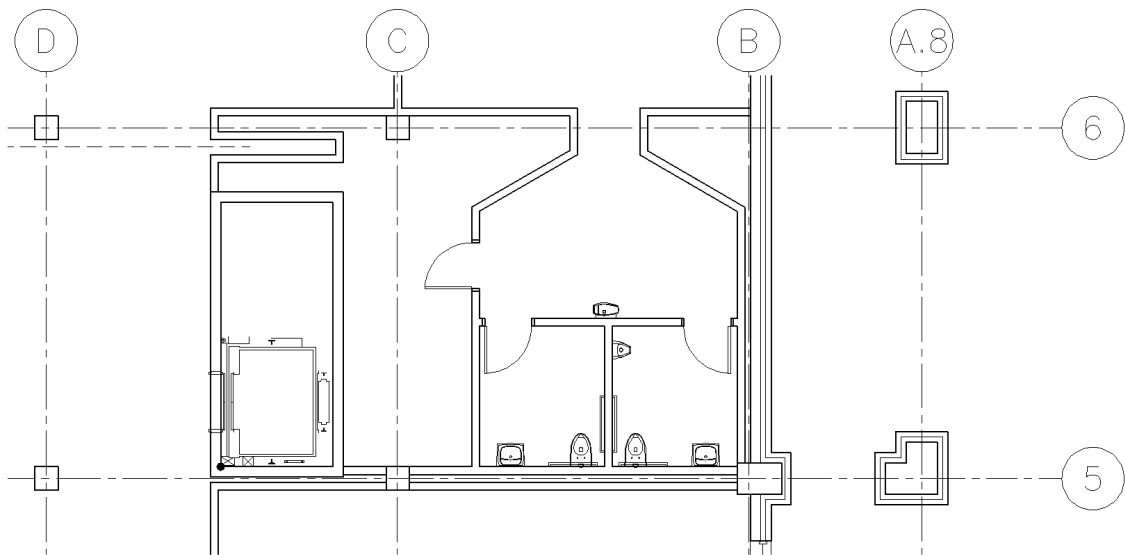

FIGURE 4-3.10   Elevator inserted into your floor plan (black dot in lower-left for reference only)

You now have one of the two elevator cars located within the shaft. In this plan you will have two elevators in the same shaft, separated only by a beam at each floor. So you still need to mirror the car and trim the wall lines at the elevator door opening.

26. Use the **Mirror** command to copy a mirror image of the elevator car to the opposite side of the shaft (Figure 4-3.11).

    TIP: Use the midpoint of one of the vertical wall lines to establish the Mirror Line (with ORTHO on).

27. **Trim** the wall lines and place the jamb lines on **A-wall** layer (not the elevator frame, just the line that closes off the wall); see Figure 4-3.11.

28. Move all the elevator lines to the proper layer (see Appendix A).

The Weight of Finishes?

Finishes are very important for several reasons when it comes to elevators. As previously mentioned the use needs to be considered (passenger or service); this will dictate the durability and cost of the finishes.

Another consideration is the weight of the material. If the Interior Designer selects wood wall panels and tile flooring (which is perfectly acceptable) the elevator manufacturer needs to know how much these materials will weigh so they can properly size the motor for optimum performance.

So, similar to coordinating with the Electrical Engineer at casework locations, coordination must also occur with many other items in the building that the Architect or Interior Designer is directly responsible for.

29. **Add two lines**, 4″ apart, between the elevators to represent a beam; place the lines on the same *Layer* as the elevator.
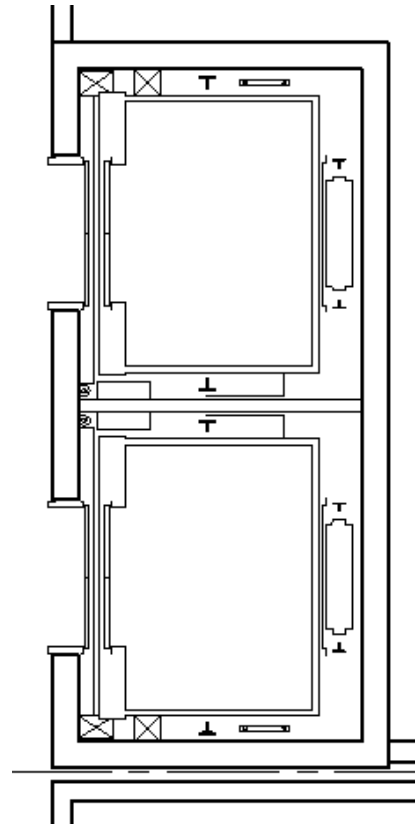
FIGURE 4-3.11
Elevator added to plan

Your elevator should now look like Figure 4-3.11. Several details are drawn, such as the guide rail, the cab door, the floor level door and even the pit ladder.

Many architectural firms have a copy of the major elevator manufacturers' technical catalogs which provide enough information to manually draw everything in Figure 4-3.11. But it is not difficult to see how the Internet can save time when AutoCAD content is available; not all manufacturers provide AutoCAD drawings of their products.

Adding the Service Elevator:

This elevator is near the loading dock area (west side of the building) and is only accessible by the library staff. It is rated for a higher capacity than the passenger cars (3000lbs. vs. 5000lbs.). The cab size is also larger to make it easier to move objects in and out.

You will be given minimal information with the expectation that you use the knowledge previously learned to locate and insert the drawing data.

30. Place the service elevator per **Figure 4-3.12**, *plus*:

    a. Use the same mfr: **ThyssenKrupp Elevator**

    b. *Type of application*:   **Traction geared**

    c. *Capacity:*   **5000**

    d. *Model:*   **SPF 50**
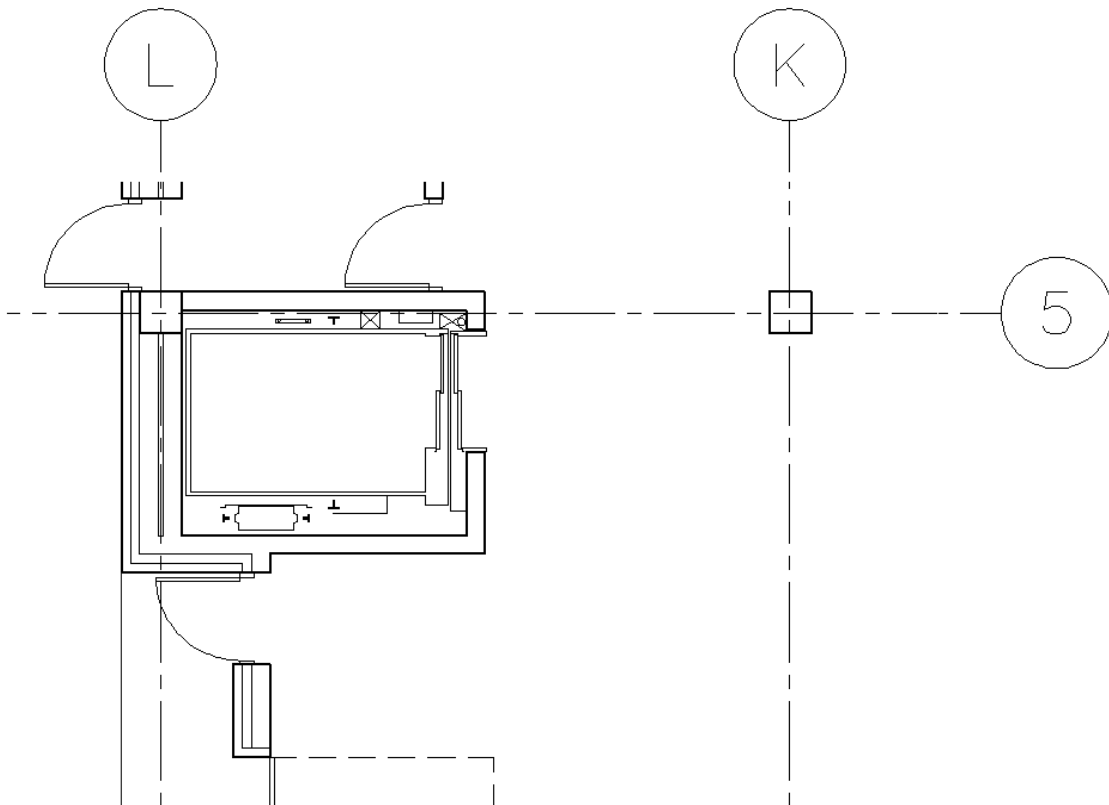
    e. Note the door orientation.

FIGURE 4-3.12   Service elevator added to plan

Adding the Open Stair:

The open stair is the primary stair used for vertical circulation in a building. This type of stair offers visual way-finding and can make an aesthetic statement for the building when located and designed well. Building codes often allow an open stair between two floors only; if one wishes to have a multi-story open stair it must have the ability to be closed off, which usually means overhead door-like fire shutters that will be lowered in the case of a fire.

Below is an example of a well designed multi-story open stair. The railings are glass with a wood cap, the treads and risers are high quality terrazzo and the walls are lined with wood panels. The stair is located next to windows which help the users know where they are in the building relative to the outside (helps with way-finding). The photo was taken through a large piece of glass that makes the stair visible at each floor within the building; in the event of a fire the fire-shutters come down and close off this view!

OPEN STAIR EXAMPLE   High quality stair with interesting design

31. Draw the open stair per **Figure 4-3.13**, *plus*:
    a. The tread lines are **13″** apart.
    b. Draw the treads on *Layer* **A-Flor-Strs**.
    c. The railings are to be drawn 2″ wide and 2″ out from the wall.
    d. The railings that are not continuous extend past the top/bottom riser by **12″** and return to the wall.
    e. Draw the railings on *Layer* **A-Flor-Hral**.
    f. The dashed lines represent the stairs and floor opening above the floor plan cut line.
    g. Draw the dashed lines on *Layer* **A-Flor-Strs-Abov**.
    h. Draw the arrow manually; you will learn a better way later.

    > **TIP:** *Use lines and a solid hatch for this.*

    i. Use the **Donut** command to make the black dot (type the word "donut" in the *command window*).

    > **TIP:** *Set the inside radius to 0″ and the outside to 4″.*

    j. Add the **text** (per standards for ⅛″ scale; 9″ high).
    k. Draw text and arrow on *Layer* **A-Flor-Strs**.
    l. Do not draw the dimensions.
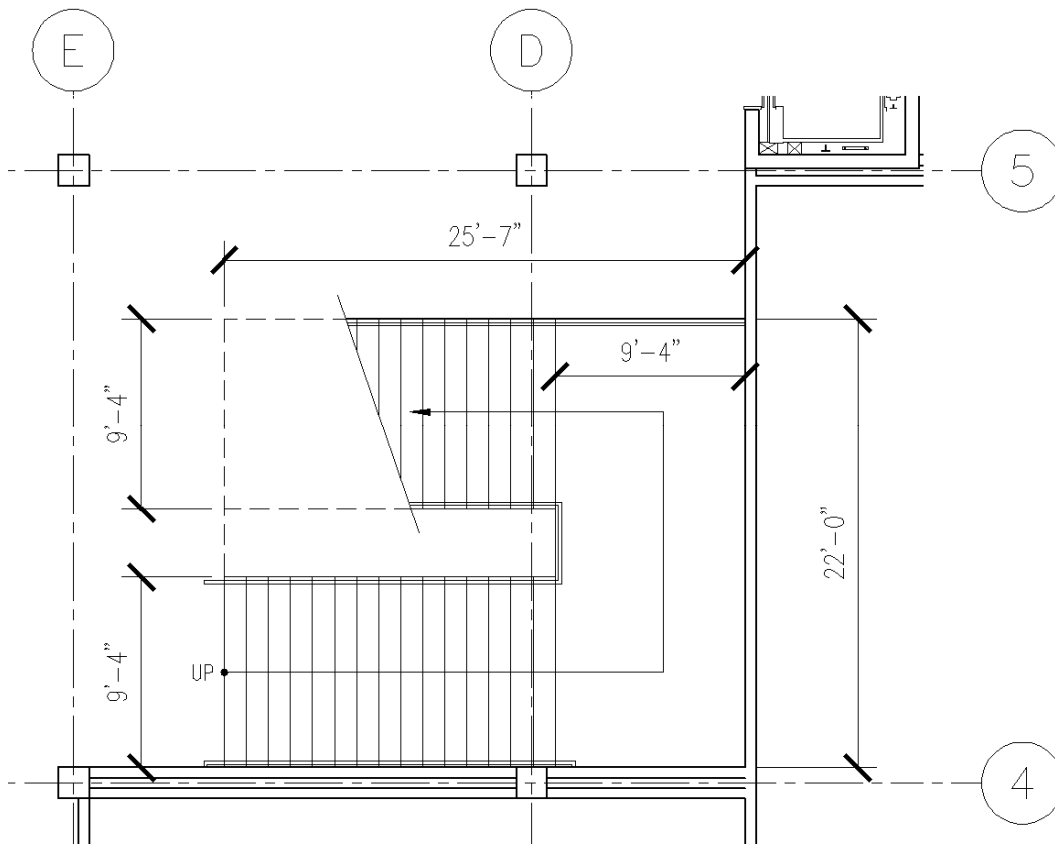   m. Draw the angled line shown on the stair *Layer*.

FIGURE 4-3.13 Open stair to be drawn

The angled line that trims the tread lines in Figure 4-3.13 represents the cut-line of the floor plan. The location of this line is not too critical, it is best to place it where the major features of the stair can still be shown. Depending on the distance between floor levels, you might have a significant space below the stair and need to show seating or flooring patterns. Codes require the lower portions of the stair (i.e., under the stair) to be enclosed so the visually impaired do not run into the stair. Sometimes it is desirable to enclose the underside of the stair completely to avoid hard-to-clean spaces; in this case you might see a wall pickup on the other side of the cut line. Even though the stair reached up past the cut line, the wall resting on the floor still continues for the length of the stair.
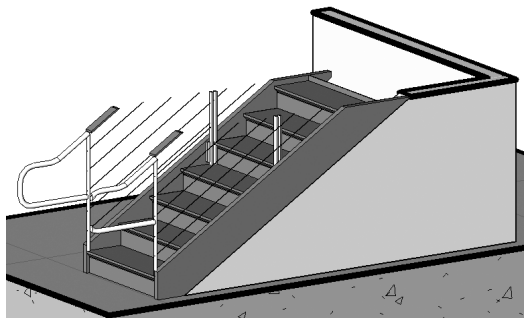
The image to the left is showing, three-dimensionally, how the floor plan cut plane impacts a stair which has a wall under it. In plan view, the break-line is added where the stair extends above the cut-plane; beyond the cut-plane you would show the wall below the stair because it is now passing through the cut-plane.

The handrail extension is dictated by the building code. The same is true with the handrails returning to the wall; this prevents people exiting the building (or fire fighters entering) from getting entangled with the handrails. The figure below (3.3.14) shows an elevation view of a wall mounted handrail to help you better understand what you are drawing.
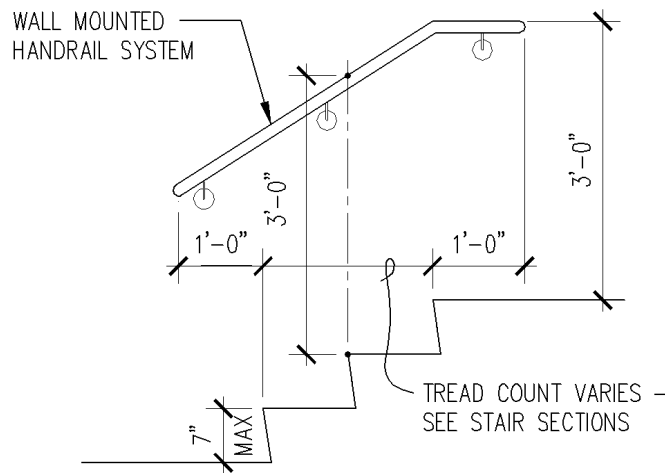
FIGURE 4-3.14   Handrail detail

In this floor plan, you would most likely add furring to the south wall to cover the structural concrete column (not required for this tutorial).

Adding the Utilitarian Stairs:

The two utilitarian stairs are almost identical; this is ideal whenever possible because it reduces the number of stair sections and details that are required in the construction documents.

As already discussed, the utilitarian stairs are not readily visible and primarily meant for emergency egress; their existence is primarily dictated by code. They are, however, often used as a means of vertical circulation within the building.

The finishes and light fixtures are simple – often painted CMU walls and surface mounted lights.

32. Following the same instructions as the previous step, draw the east stair per **Figure 4-3.15**, plus
    a. Draw the inside handrail 2″ in from the stair edge (see photo).
    b. Draw two angled break lines with void between.
    c. The tread lines are **11″** apart.

Notice in Figure 4-3.15 that the angled break lines help to delineate both the *up run* and the *down run*, which would otherwise overlap and be confusing.

33. Using *Copy* (not Copy to clipboard) and *Mirror*, copy the east stair into the west stair shaft (see **Figure 4-3.16**).
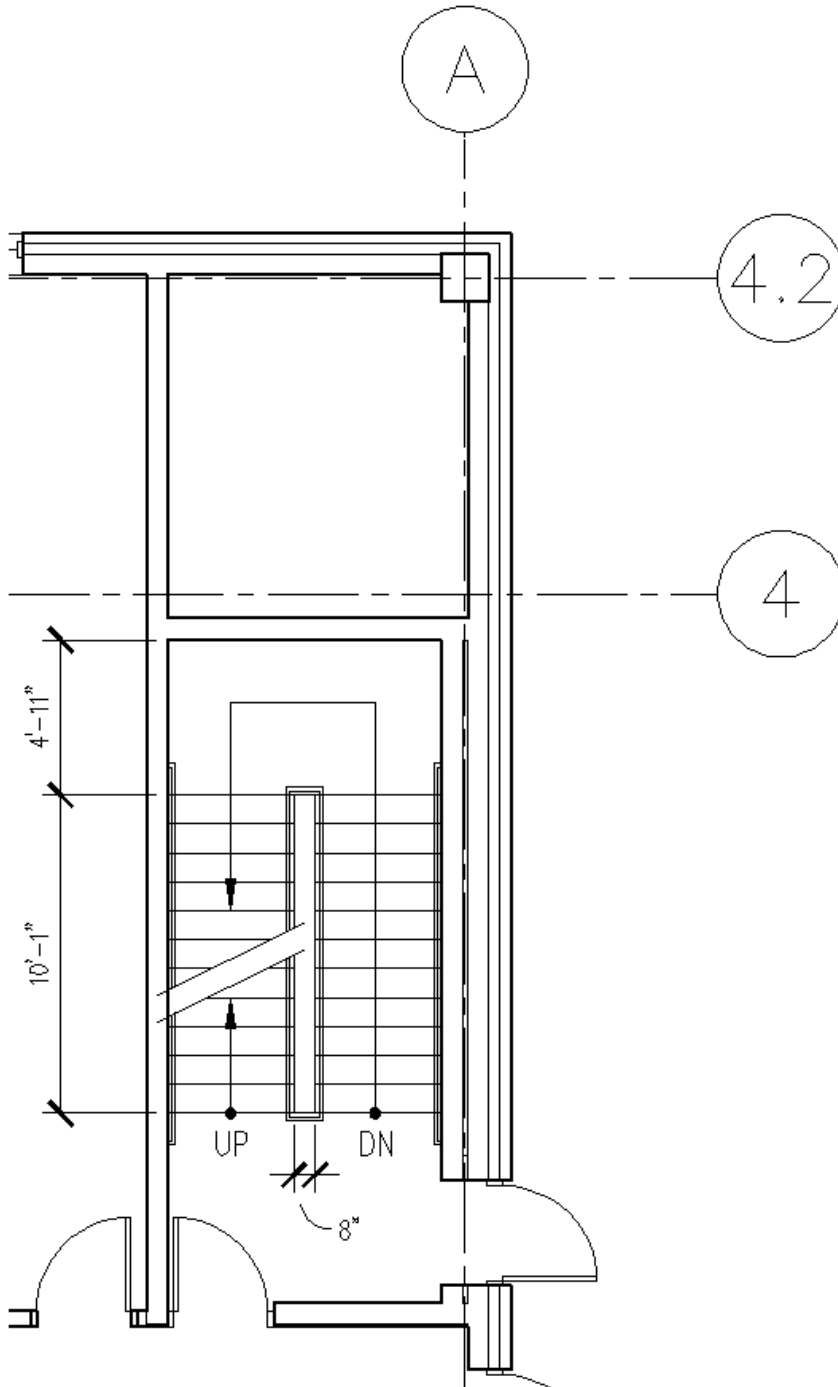
FIGURE 4-3.15   East utility stair shaft

Why two walls at the exterior walls in the stair shaft? This is a problem that requires the ability to think three-dimensionally. It should be obvious to you that a beam spans between two columns; typically at each floor level and at the roof. Well, the stair shaft is a tall room that passes multiple floors. Thus, the stair shaft needs to occur outside the beam line, which is centered on the column/grid lines.
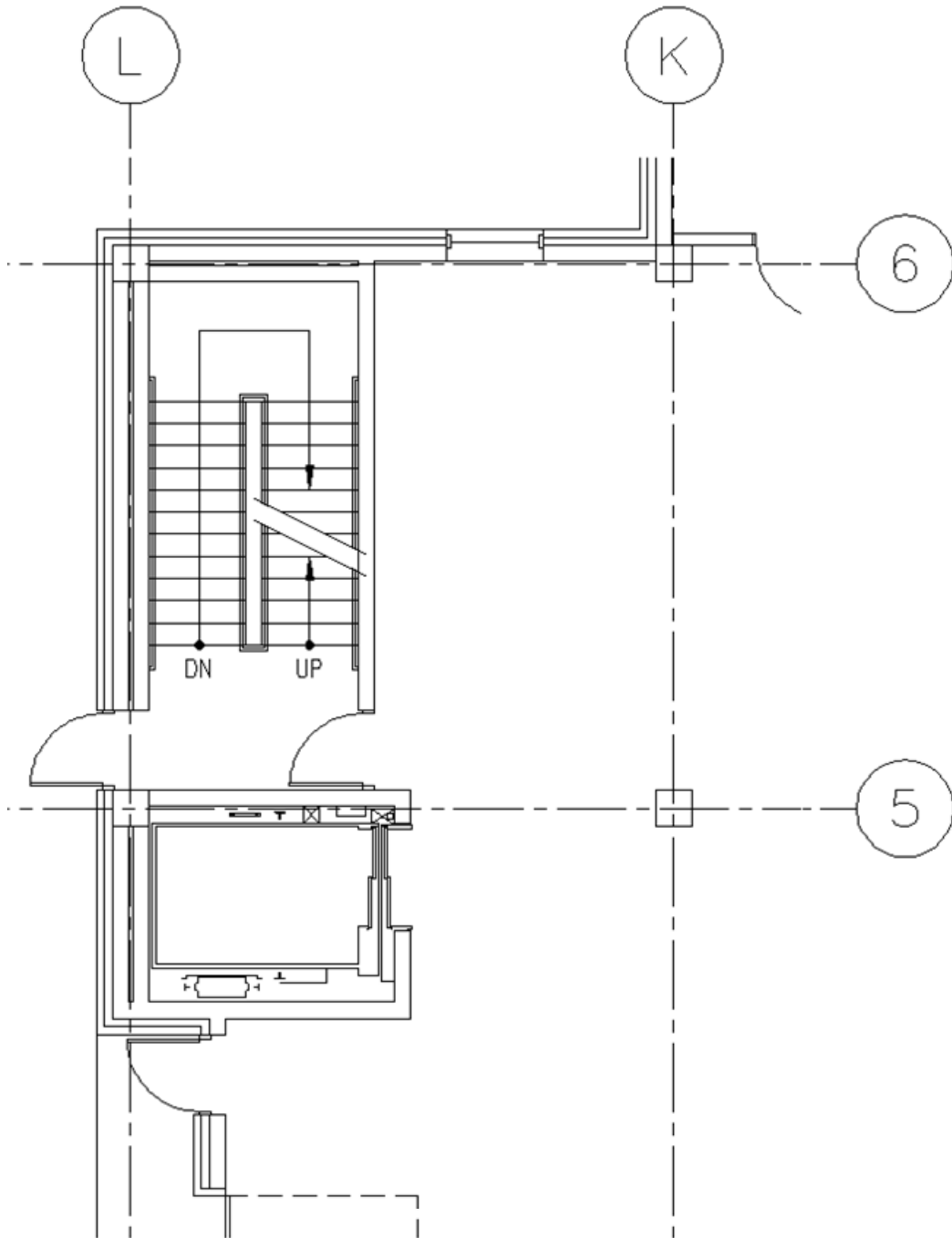
FIGURE 4-3.16   West utility stair shaft

If you were drawing the other floors in this building you would Copy/Paste the stairs to the other drawings; the upper floor and basement would need to be modified.

In stairs, building codes often require a gate at the ground level and at the upper level (if the stair continues to the roof) as shown in the photo below. The reason for this is to help guide people in an emergency. Each floor in the utilitarian stair shaft looks the same, so it would be easy for a person (especially in a panicked state) to pass the ground level exit and continue down one or two more floors to the basement; extending their time in a dangerous situation. If the stair is used for normal, day-to-day, vertical circulation, some building officials will allow the gate to be placed on a magnetic hold-open which allows the gate to close in the event of a fire.
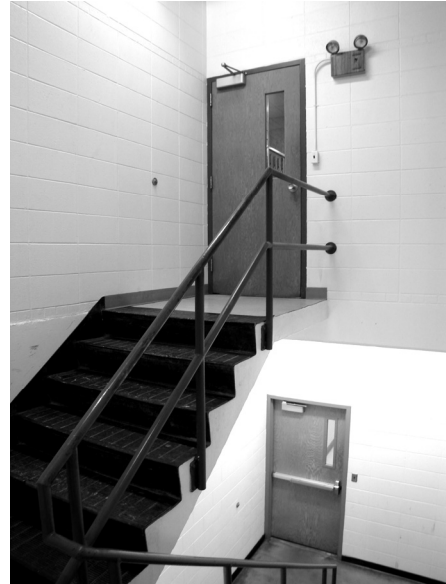
Most commercial codes also require that a sphere 4″ or larger not be able to pass through the guardrail. This has a large impact on design but creates a safe environment for the users; looking that the photo above it is not difficult to see how older codes allowed for unsafe designs!

Also notice, in the photo below, that the handrails return to the guardrail or the wall as previously discussed.

Exercise 4-4:
Annotations

Introduction

This exercise involves adding room names and numbers, as well as each room's square footage. The square footage will be added via an AutoCAD feature called *Fields*, which will update automatically when a room changes!

Room Numbering:

Room numbers typically start at the main entry and then proceed in a logical direction (e.g., clockwise). Sometimes the numbering is coordinated with the signage schedule (i.e., the rooms that are not numbered on a sign get skipped until the end numbers).

You will start the room numbering at the main entry and work in a clockwise direction. Later, you will use this information to generate a room finish schedule.

Room numbers will be three digits, with the first number corresponding to the floor that room is on. For example, the janitor's closet on the first floor might be **1**34 and the janitor's closet on the third floor might be **3**12.

Room Square Footage:

To get the square footage, one can draw a *Polyline* and use the *Area* command to list its square footage. Specifically, draw a continuous *Polyline* (pline) using *Object Snaps*, before picking the last point (i.e., the starting point) type C for close to create a Closed Polyline; and then type *Area* and select the polyline – the square inches and square foot will be listed. The polyline can be placed on *Layer* A-Area-Bdry and turned off for future reference (e.g., the room size changes and you need to update the area).

The text for the room names will be AutoCAD *Style* **Bold** per the "office standards" (see Appendix A). The room name and number will be 12″ high and the square footage text will be 9″ high. All the text (name, number, sf) shall all be in one Mtext object (i.e., typed all at once – not three separate commands). Just like working in a word processor, you can select a portion of text and edit its properties – this is how you have two text heights in one Mtext object.

1. Use the **Style** command to set up the "Bold" AutoCAD *Text Style* in your floor plan drawing. (See Appendix, page A-14, for more information.)

2. Create the *Layer* for your "area" polylines (see Appendix for *Layer* name and color).

3. Set the new area *Layer* to be current.

Next you will draw a *Polyline* to create an enclosed area for each room. A *Polyline* is a special line in AutoCAD that can contain several straight line segments that are all connected together. When a *Polyline* is used, you can see how many square feet are contained with the enclosed area as well as the length of the perimeter. These values are very helpful for estimating quantities and project costs.

4. Using the **Polyline** command (see image to the right), draw an enclosed area in the Vestibule as shown in Figure 4-4.1.

   TIP: *Start the Polyline command, and start picking points (all the inside and outside corners of the room, a.k.a., the finished face of the room).*

   TIP: *Instead of clicking the last point directly (i.e., clicking on the first point), simply type C (for Close) and AutoCAD will finish the Polyline for you. This will make sure that the Polyline is truly closed, which is important for getting the square footage and hatching.*
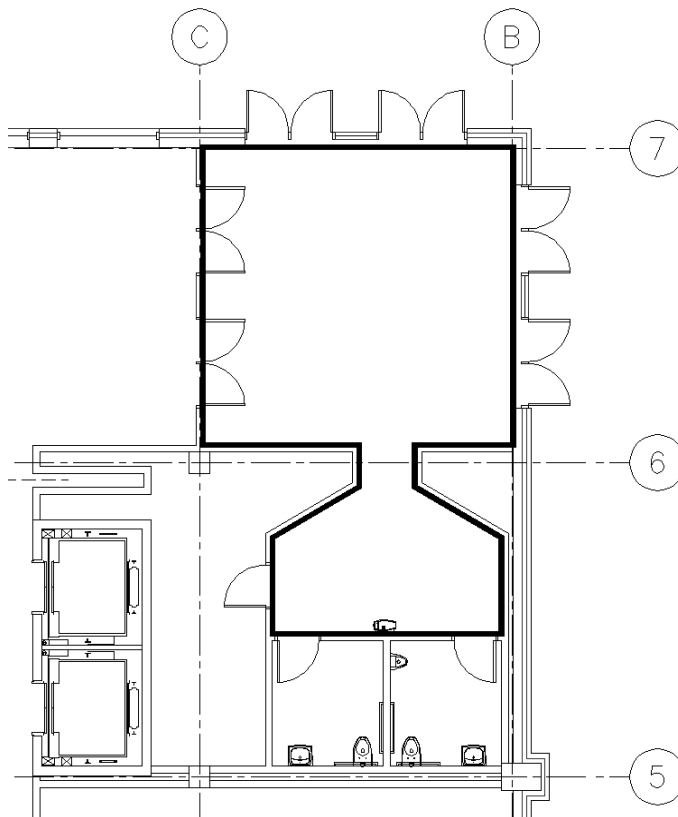
FIGURE 4-4.1   Adding a polyline at the vestibule

5. Select the *Polyline* created in the previous step.

6. Right-click and select **Properties** from the pop-up menu.

7. Notice the **Area** and **Length** (which is the Perimeter in this case) properties listed (Figure 4-4.2).

The *Area* property lists square inches and square feet; square inch is not very useful, but it is the default unit for architectural drawings.

Note that a *Polyline* does not have to be closed; it could be a curb for the length of a road or an irregular line representing the transition between two floor finishes.

Polyline	▼
General	
Color	■ ByLayer
Layer	A-Area-Bdry
Linetype	——— ByLayer
Linetype scale	1.0000
Plot style	ByColor
Lineweight	——— ByLayer
Hyperlink	
Transparency	ByLayer
Thickness	0"
3D Visualization	
Material	ByLayer
Geometry	
Vertex	1
Vertex X	195'-6"
Vertex Y	1'-3"
Start segment width	0"
End segment width	0"
Global width	0"
Elevation	0"
Area	92036.4047 sq. in. (639.1417 sq. ft.)
Length	134'-0 5/8"
Misc	
Closed	Yes
Linetype generation	Disabled

8. Press **Escape** (i.e., the *Esc* key) to unselect the *Polyline*.

FIGURE 4-4.2   Polyline properties

TIP: Be sure your cursor is not over the Properties Palette when you press the Esc key.
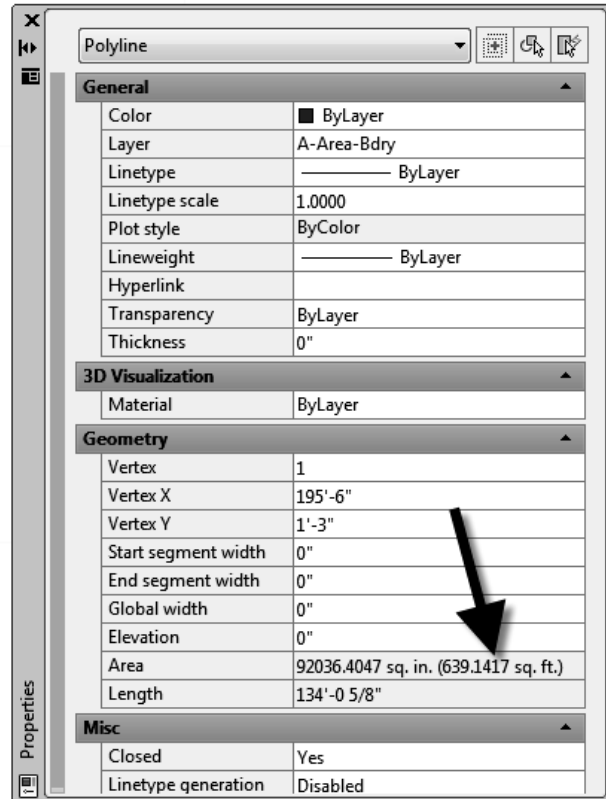
Now you will use the *Mtext* command to add the room number, name and square footage. The square footage information will be added by placing a *Field* in the Mtext editor, which automatically gets the area from the *Polyline*.

9. Add the text to the Vestibule as shown (as Multiline Text) in Figure 4-4.3, *plus*:

   a. Place text on *Layer* **A-Area-Iden**.

   b. Style: **Bold**.

   c. Room name and number: **12″ high**.

   d. All text in one *Mtext* object; proceed to the next step; do not exit the *Mtext* edit mode – see the note below.

*NOTE: You cannot have multiple text heights in one Mtext object. Therefore, to complete this section successfully you should not use the Annotative Scaling feature for text. Type **Style** and make sure the Bold style (see page A-14 in Appendix A) does not have Annotative checked and the Text Height field is set to 0′-0″.*
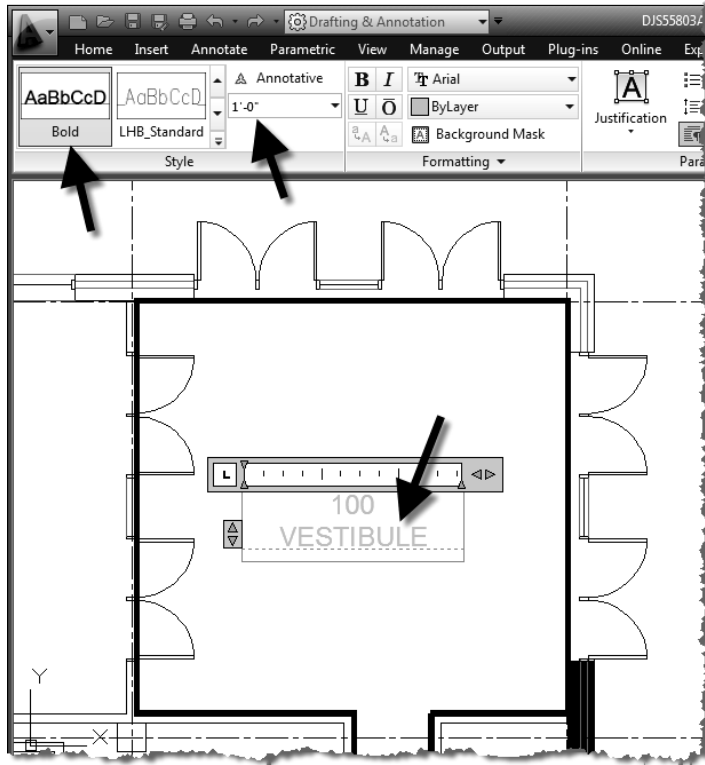
FIGURE 4-4.3　　Adding vestibule number and name

Inserting Fields:

10. *While still in text edit mode,* press **Enter** to start a third line.

11. **Right-click** to access the pop-up menu.

12. Select **Insert field…** (Figure 4-4.4).

You are now in the *Field* dialog box (Figure 4-4.5) where you specify what type of information you what this specific *Field* to display. You can have things like the date, file name and much more, and they automatically update if they change.

> **NOTE:** *One* Field *object only holds one piece of information, but you can add as many* Fields *as required.*
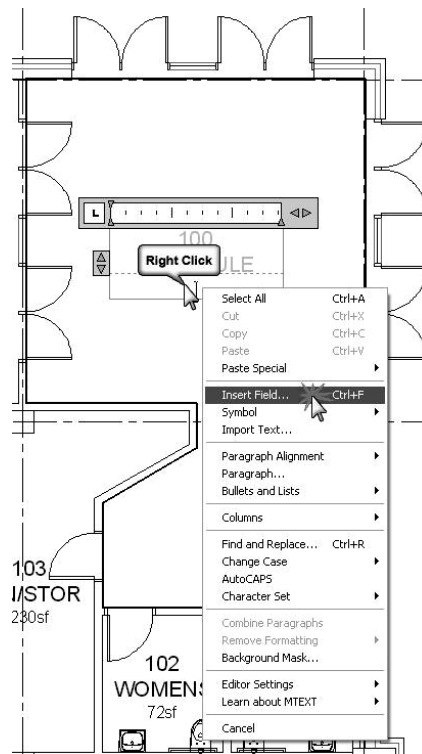
FIGURE 4-4.4　　Adding a field

13. Under *Field category*, select **Objects** (Figure 4-4.5).

14. Under *Field names*, click **Object** (Figure 4-4.5).

15. Under *Object type*, click the **Select object** button (Figure 4-4.5).
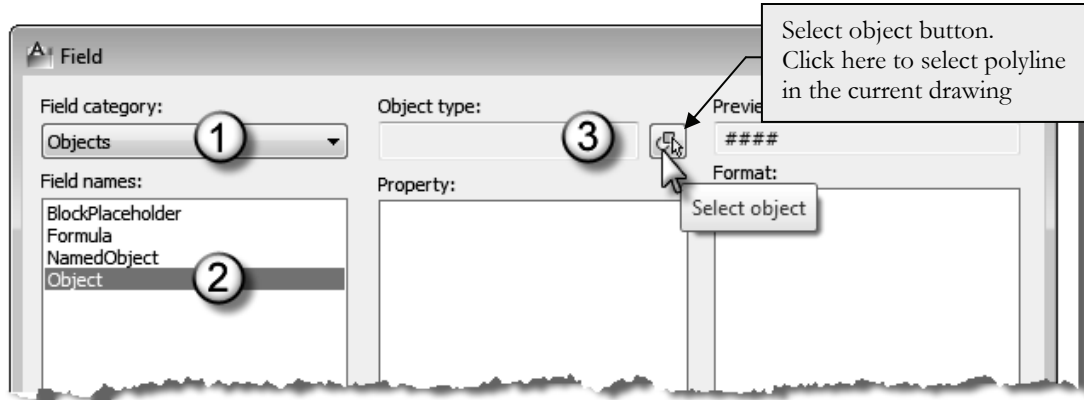
FIGURE 4-4.5   Field dialog box

16. **Select** the ***Polyline*** drawn at the perimeter of the vestibule; you can Zoom in/out using the scroll wheel on the mouse, if needed.

As soon as you select the *Polyline* you are returned to the *Field* dialog box. Notice that the *Object type* is listed as Polyline; this is a good way to make sure you selected the correct object. (If it listed Line rather than Polyline, that would mean you accidentally picked a wall or grid line.)

17. Select **Architectural** under *Format* and set the *Precision* to **0**. Notice the *Preview* changes (Figure 4-4.6).
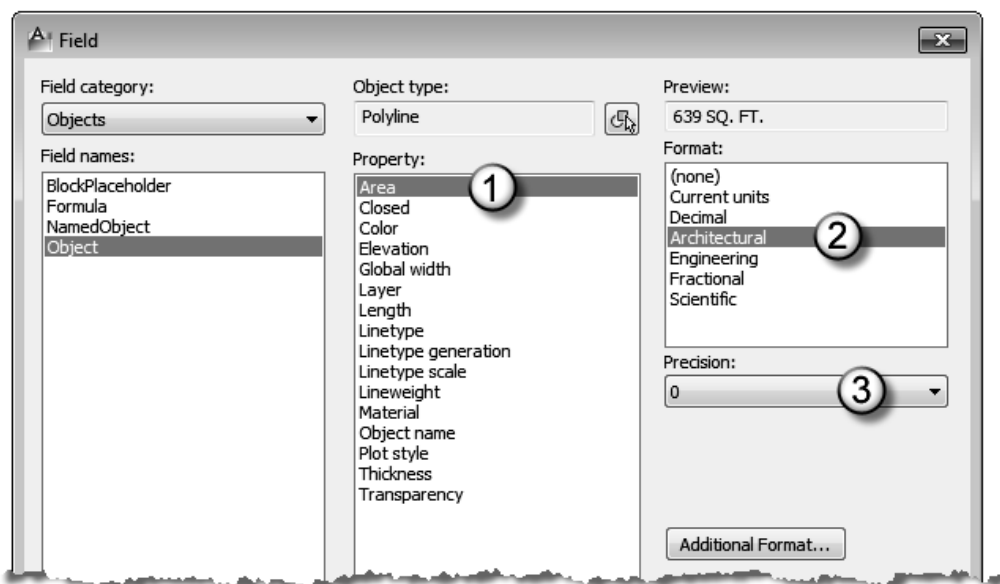
FIGURE 4-4.6   Field dialog box; polyline selected

18. Click **OK** to close the dialog and add the *Field* to the Mtext.

The area of the *Polyline* is now displayed in a shaded rectangle (Figure 4-4.7). The shaded rectangle does not print; it is displayed on the screen so you can easily tell the difference between regular text and *Fields*.
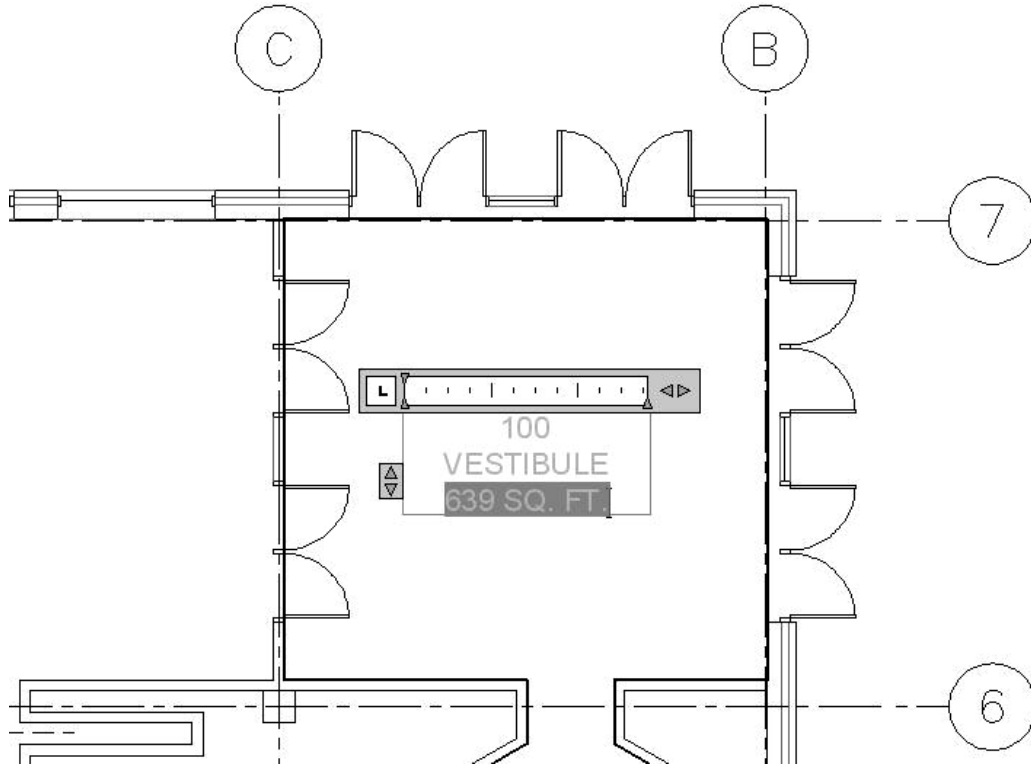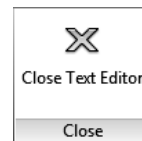

FIGURE 4-4.7   Field added to Mtext object

The last thing you need to do is adjust the size of the area text. It could be left as-is, but it will look better if it is a little smaller than the other text.

19. Click anywhere on the *Field* object and the entire *Field* will select. Set the text height: **9″** on the *Ribbon*.

20. Click **Close Text Editor** to finish the *Mtext* object.

As you can see, the Mtext object can contain various text heights and Fields. This is helpful when you want to move the text; you only have to select one thing to move rather than three (in this example).

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Next you will take a quick look at how the *Field* information updates when the *Polyline* is modified. Before proceeding, you will undo these changes.

21. Stretch the interior wall and doors per the following tips:

   a.   Make sure the **A-Area-Bdry** *Layer* is on and the *Polyline* is visible (you want the Polyline to be stretched).

   b.   Select the **Stretch** icon from the **Modify** panel.

   c.   Pick a ***Crossing Window*** (picking from right to left) as shown in Figure 4-4.8, being careful not to include the C/6 column's insertion point within the *Crossing Window*.

   d.   *Select the two displacement points:* **First**, pick the lower left area of the selected objects, **and then** pick the outside corner (to the left) of the wall you are trying to align the doors with.
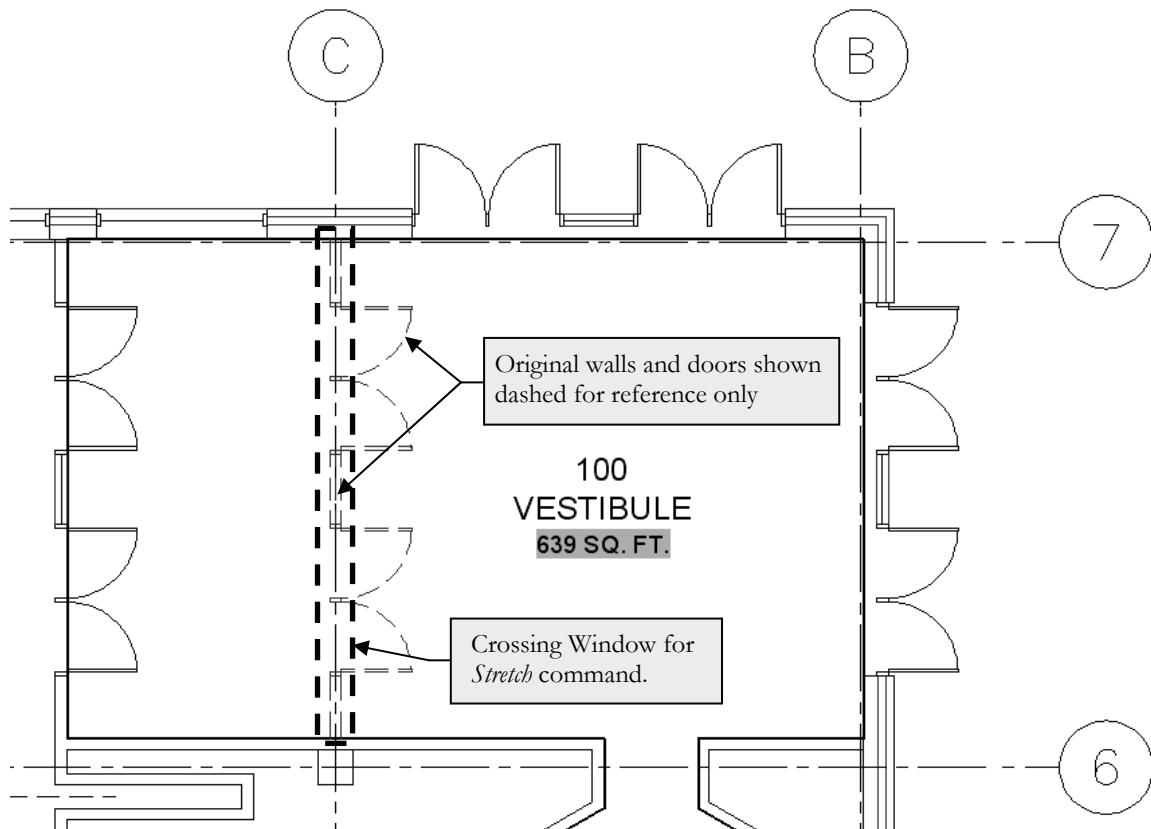

Original walls and doors shown dashed for reference only

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Crossing Window for *Stretch* command.

FIGURE 4-4.8   Stretching the vestibule wall

After stretching the Polyline you will notice the square footage did not update yet. The Field information is correct, but the graphic representation has not updated yet. The graphics are updated by a drawing regeneration, plotting and/or closing and reopening the drawing.

22. Type **Regen** in the *Command Window* and then press **Enter**.

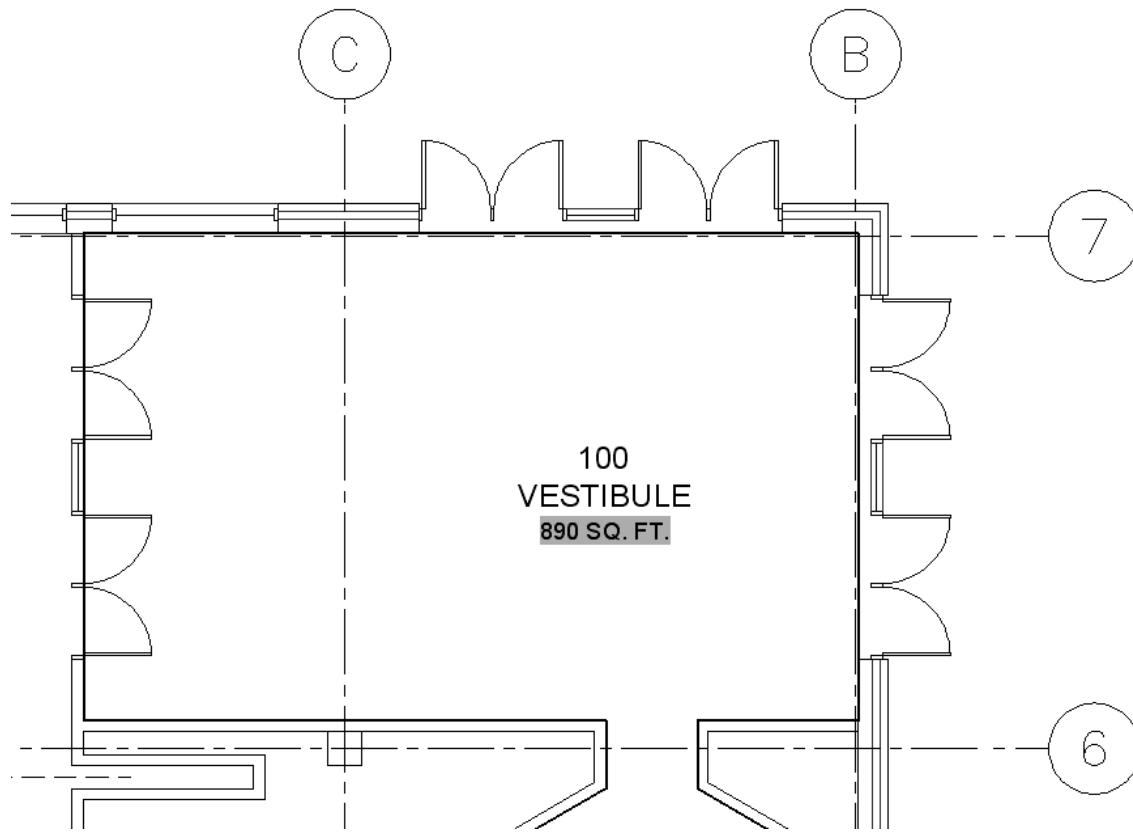Notice in Figure 4-4.9 that the *Field* is now updated!

FIGURE 4-4.9   Field information updated automatically

23. Click the **Undo** icon twice (once for the Regen and once for the Stretch) to get your drawing back to its original state.

Practice Makes Perfect…

You will repeat the previous steps to add the room information to each space. The steps are pretty simple: (1) draw the *Polyline*, (2) create the *Mtext*, and (3) insert the *Field* before closing the *Mtext*.

Next, you will be given several plan views with all the room names, numbers and square footages (shaded rectangle for Fields is not visible in these views). If you have trouble reading the area numbers, don't worry as the field object will fill it in automatically; they do serve as a double-check to make sure you drew the rooms correctly.

24. Per the previous instruction: create a *Polyline* and add the room information (as *Mtext + Field*) for the remaining rooms, as shown in Figures 4-4.10 through 4-4.13; you may ignore the areas not labeled.

The text location can vary in each room, but the ideal location is centered in the room and aligned with adjacent room labels. These locations get moved as the plans develop, so the text does not overlap furniture/notes/ dimensions/etc.

25. Freeze the *Layer* **A-Area-Bdry** to make the *Polylines* disappear.

The *Fields* will still reference the *Polylines* even when they are on a frozen *Layer*. However, you need to remember to thaw this *Layer* before stretching or modifying any walls if you want the area to update automatically.

Once you get one room label set up with the properly formatted text (i.e., 12″ and 9″ high text) you can copy that one, with *ORTHO* on, into other rooms. Once copied, you can double-click on the text to open it in the *Mtext* editor. Then you can edit the regular text and right-click on the Field to select Edit Field, which will allow you to select another Polyline. (If you do not edit the Field, it will continue to list the area of the previous space.) Using *ORTHO* (toggle icon located on the *Status Bar*) helps to keep the text aligned horizontally or vertically.
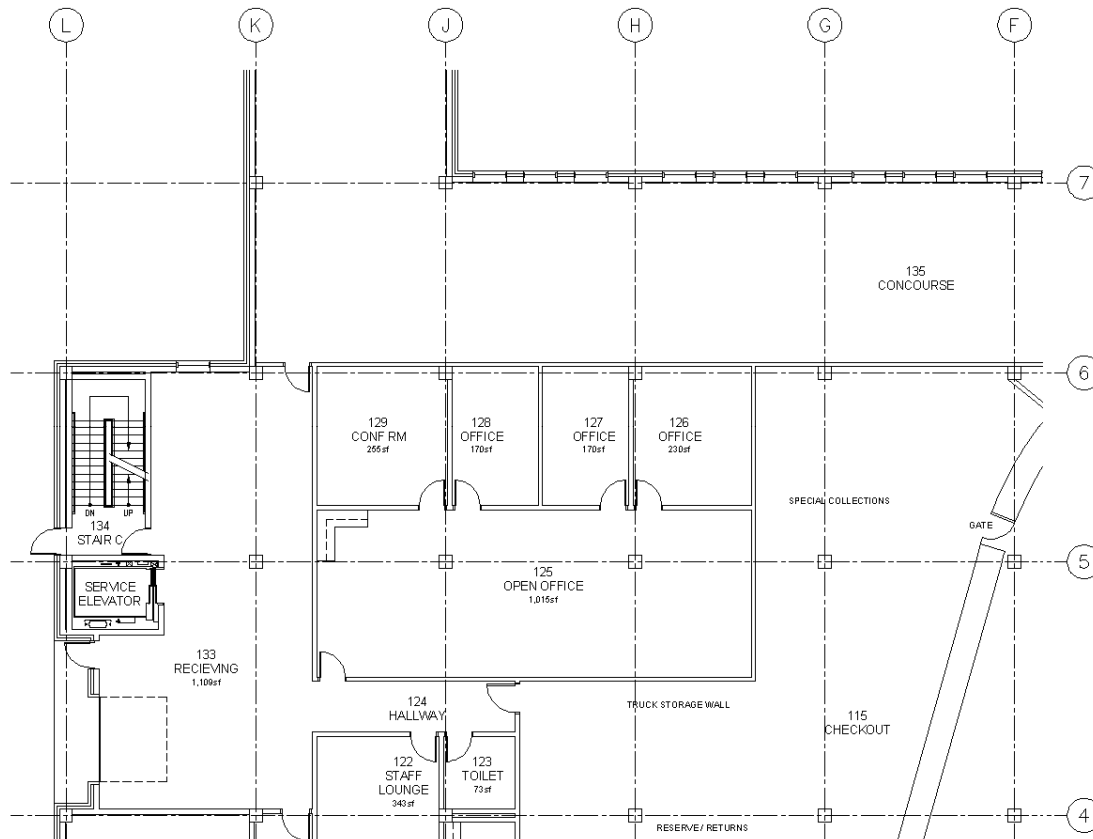
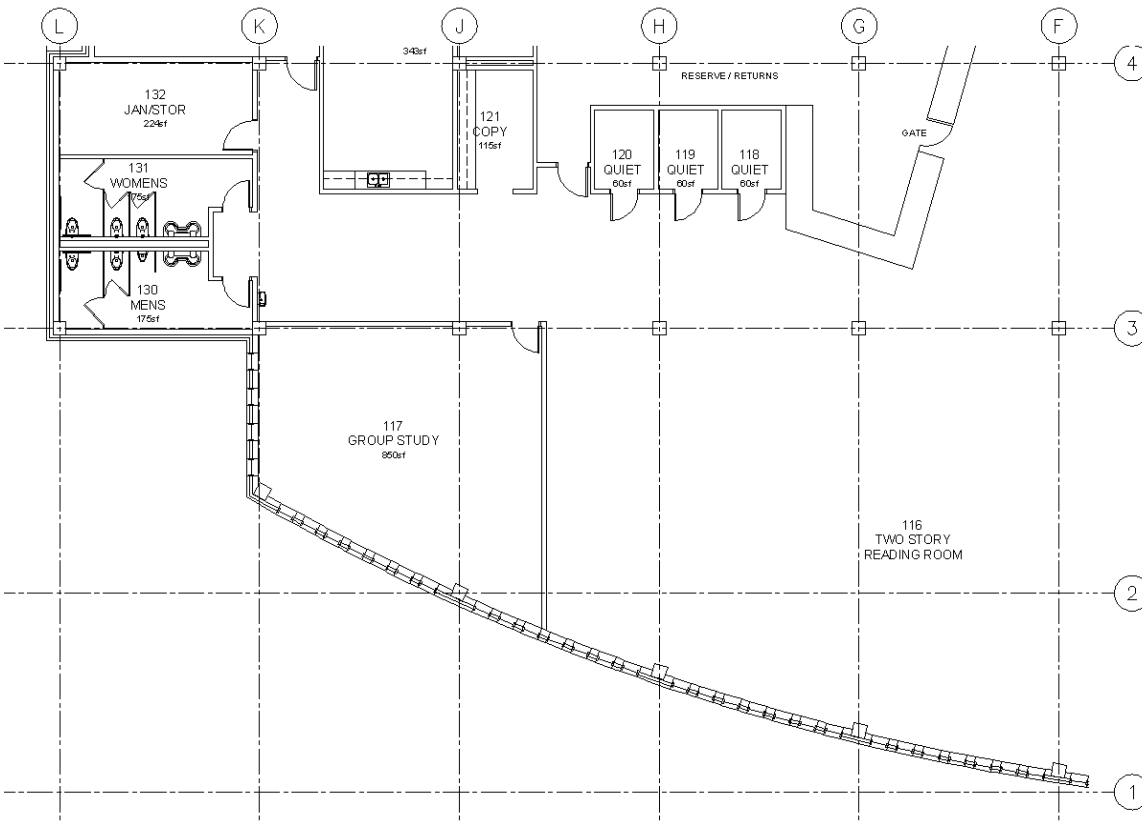**FIGURE 4-4.10**   Adding room information
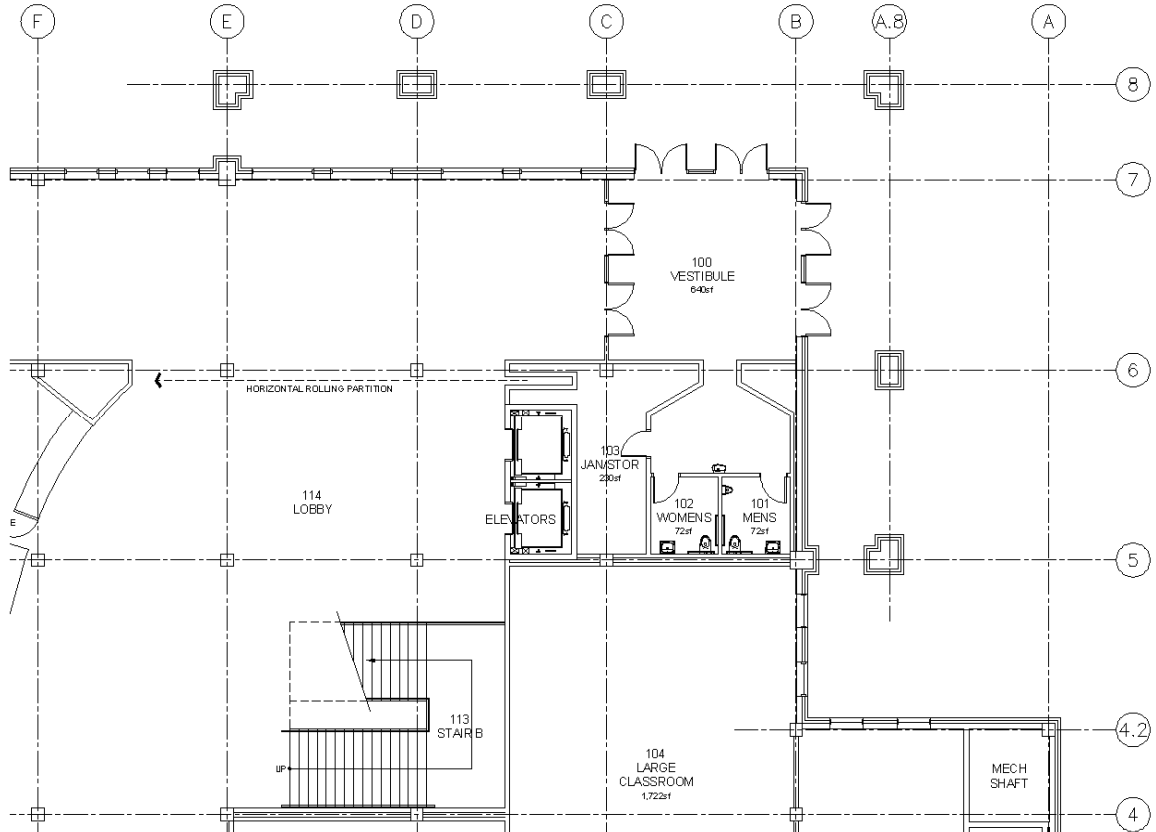

FIGURE 4-4.11   Adding room information

FIGURE 4-4.12   Adding room information
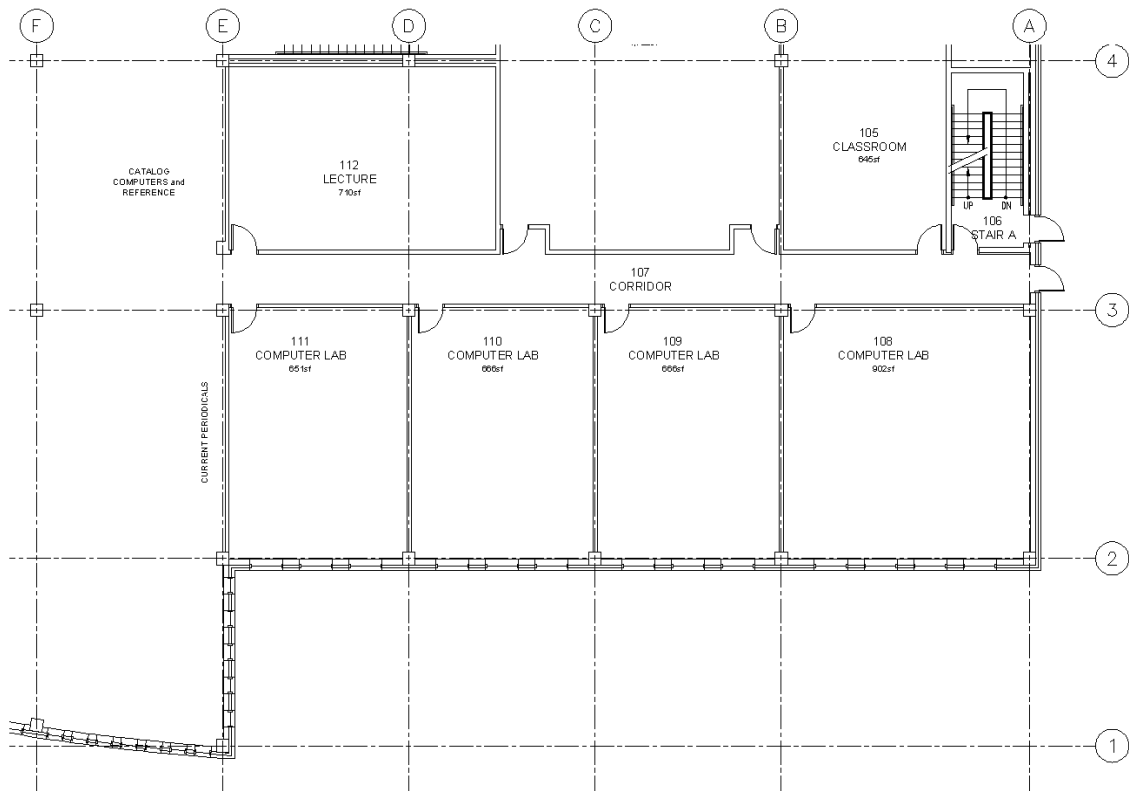

FIGURE 4-4.13   Adding room information

Exercise 4-5:
Presentation Graphics: Solid Filled Walls

Introduction

The walls are often filled solid during the Schematic Design and Design Development phases so the walls punch out better when presented to the client. This is done using the **Hatch** command and the hatching is placed on a special *Layer* that can be turned off as the plan develops (into the Construction Documents phase).

One of the many unspoken rules in many design firms is that hatching should be limited to only a few (or one large) areas. For example, when using the *Boundaries: Pick Points* feature of the *Hatch* command (a feature that automatically finds the boundary of an area by picking a point anywhere within the enclosed area) you need to limit how many points you pick at one time, or make sure you check the "make separate hatches" check box.

Otherwise, you might hatch half the plan which would be a single entity. If you need to change one little area (e.g., a wall moves 1″ to the west) you would have to erase the hatch and recreate the hatching for half the plan.

Another thing to be careful of is not to create too many "little" hatches in one area. For example, if you do check "make separate hatches", each click of the mouse creates a separate hatch. So if grid lines and break lines cross an area of wall it would be better if that hatch was one object rather than several small hatches that look like one.

Don't forget the power of the *Block*! If you had to add a solid fill to the structural columns, you could simply double-click on one of the columns to open it in the *Block Editor* (as instructed in Lesson 3), add the hatch and save/redefine the *Block*. All the columns will automatically be updated! Make sure the hatch is placed on a separate *Layer* so its visibility can be controlled independently from the column itself. Now you will hatch all the walls with a solid hatch; placing the hatch on a special *Layer*.

Looking at Figure 4-5.1 you can see it would take three picks just to *Hatch* the area between the two windows. Also, the grid lines bisect several walls which would require several extra picks as well. This is one of the main reasons for dividing things up onto separate *Layers*, so you can turn them off when they are not needed.

1. Using the *Layer* **Off** tool from the **Layers** panel (**Home** tab), turn off the grid lines and the wall cavity lines (Figure 4-5.1).

Notice how the *Layer Off* tool was able to turn off the grid line *Layer* even though it was part of an external reference!
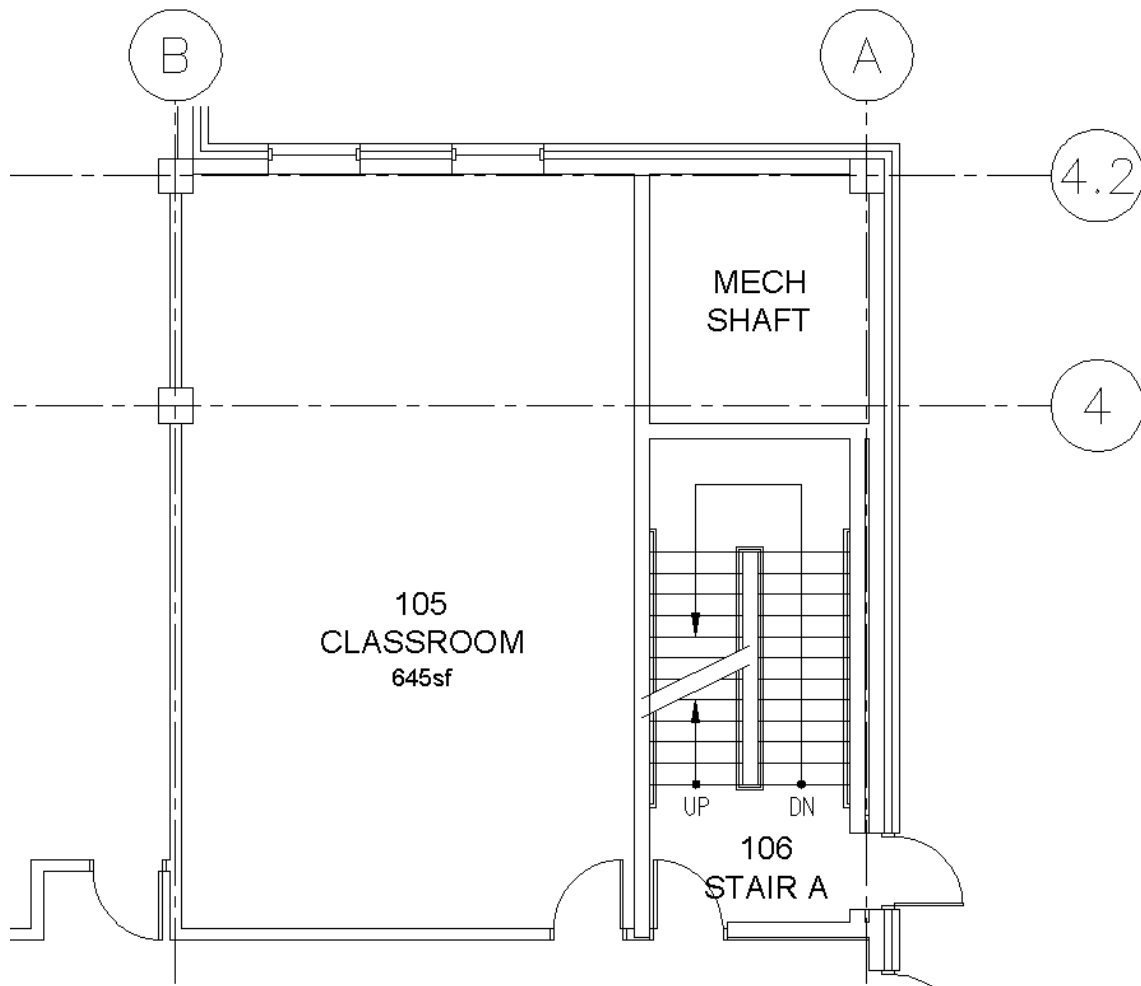
FIGURE 4-5.1   Plan view near east stair shaft

Notice the floor plan in Figure 4-5.2; the walls are now uninterrupted and ready to be hatched.
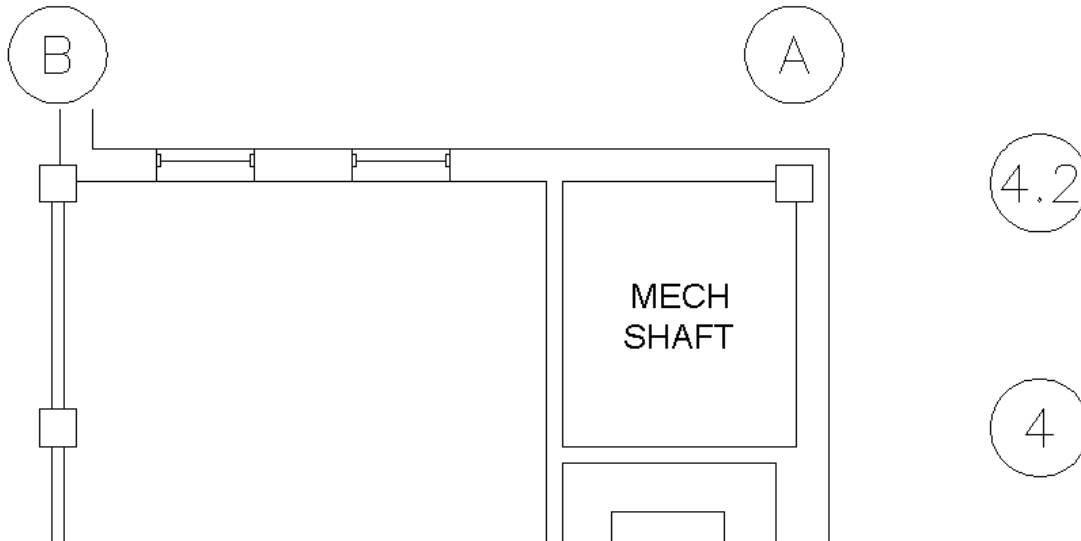
FIGURE 4-5.2   Plan view near east stair shaft – layers turned off

Next you will create a *Layer* to place the wall *Hatch* on.

2. Create *Layer* **A-Wall-Patt-Temp** (color red) and set it current.

    a. *If you want the hatch to be a shade rather than solid black, you can set the Layer color to 253 or 254.*

With the *Layer* set current, all *Hatching* will be placed on the proper *Layer* – avoiding the need to select the *Hatch* and switch its *Layer* after it has been drawn.

3. Select the **Hatch** icon on the **Draw** panel *or type H and Enter on the keyboard.*

4. Set the hatch *Pattern* to **Solid** (Figure 4-5.3).

5. In the *Options* panel (Figure 4-5.3):

    a. Check **Associative** *(should already be checked).*

    b. Check **Create separate hatches** *(located in panel fly-out).*

    c. Set the *Draw Order* option to **Send behind boundary** *(located in panel fly-out).*

    FYI: *The **Associative** feature of the **Hatch** command can be very handy. When it is checked, AutoCAD remembers the boundary that was used to create the hatch, and if the boundary changes that hatch is updated. So if you stretch a wall 12″ to the east the hatching will update automatically. If any part of the boundary gets erased the associativity will be lost.*
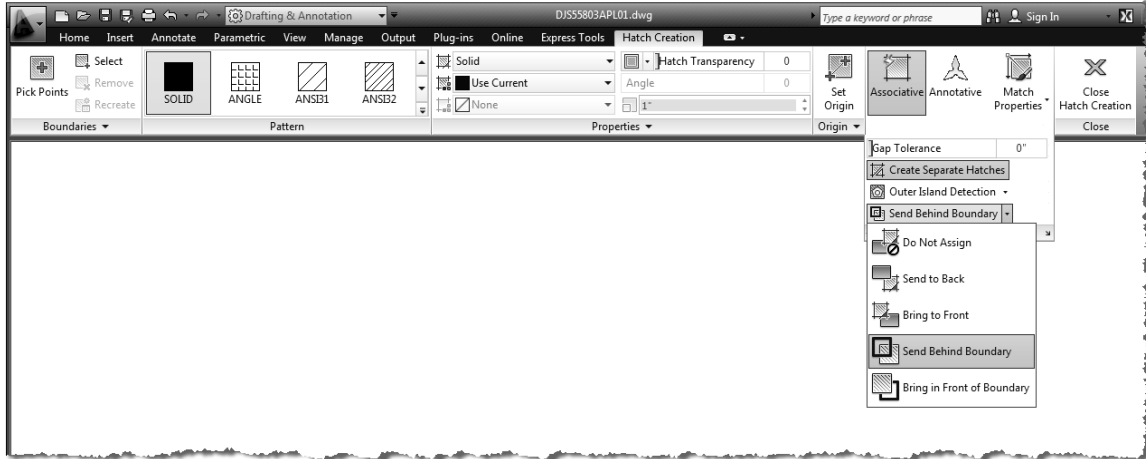
FIGURE 4-5.3 Hatch tab on the Ribbon (Options panel shown expanded

6. With the *Ribbon* options selected, begin clicking within walls to select areas (they will highlight as you select them); click **Close Hatch Creation** to finish the *Hatch* command.

> *TIP: Even with "create separate hatches" checked you should still limit the number of areas you select at once to avoid messing up and having to start all over again.*

    a. Do not hatch the concrete columns at this time

7. Continue the hatching process until all walls are hatched.

    a. Again, do not hatch the concrete columns at this time

As you can see in Figure 4-5.4 the walls and window punch out very well compared to Figure 4-5.1. This is also true for items like casework and furniture; they read better!
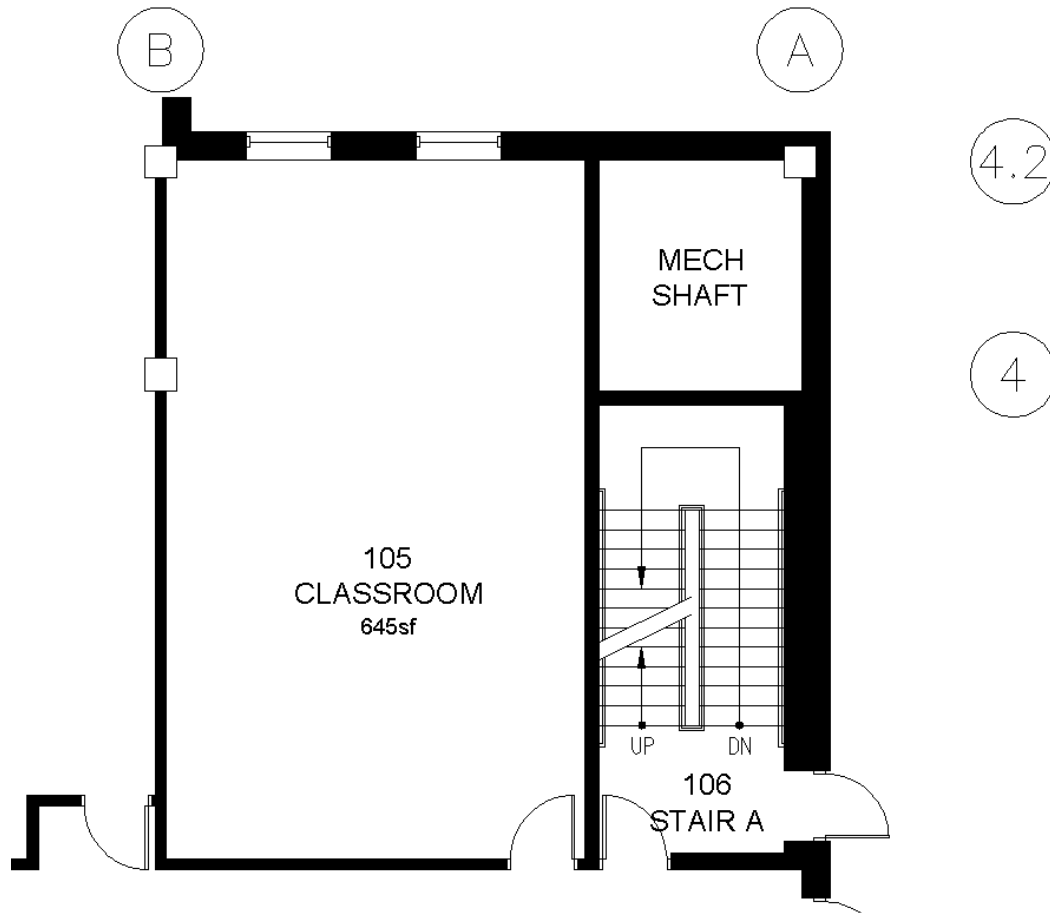
FIGURE 4-5.4   Plan view near east stair shaft with walls hatched

Once you get all the walls hatched you will want to turn the grid lines and wall cavity lines back on. There are two ways to do this quickly.

- If you have not made any other *Layer* manipulations or closed AutoCAD, you can simply click the **Layer Previous** icon.

- Another method is to open the *Layer Manager* and right-click on any *Layer* name and click "**Select All**" from the pop-up menu. Then you can click any *Layer* icon that is "off" and all *Layers* will be turned "on" (see Figure 4-5.5).

8. Using one of the methods just described, restore the visibility of the **A-Wall-Cvty** and ***DJS55803AGD01|A-Grid*** *Layers*.
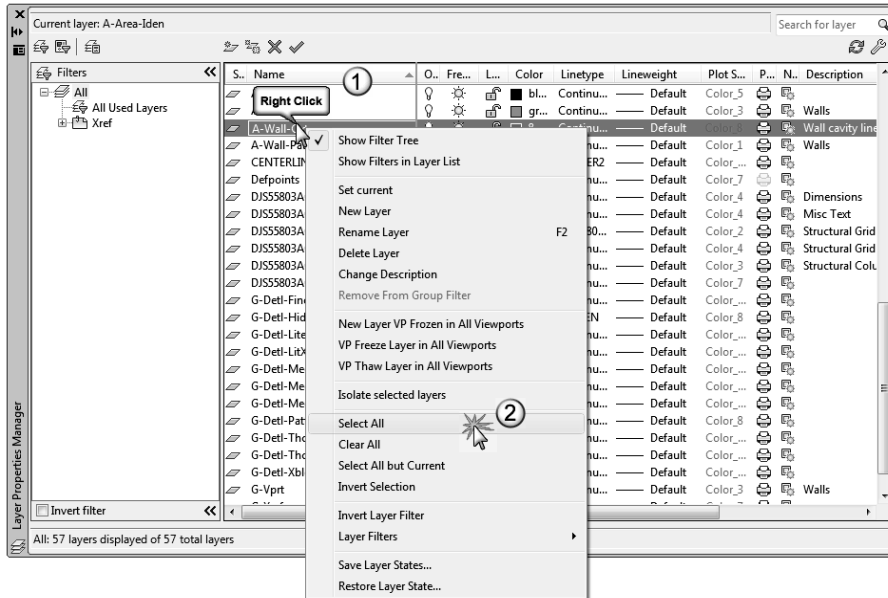
Your drawing should now look like Figure 4-5.7.

FIGURE 4-5.5   Layer Manager; right-click and pick "select all"

Take a moment and notice the other tools available in the right-click pop-up menu shown in Figure 4-5.5.

In the text box in the upper right of the *Layer Manager* (that has the light gray words "Search for layer"; see Figure 4-5.5) you can type something like ***grid*** and see only the *Layers* that have the letter/word "grid" in them (e.g., A-Grid, A-Grid-Iden, DJSAGD01|S-Grid, etc). See Figure 4-5.6 below for an example where only the *Layers* with the word "**wall**" are listed.
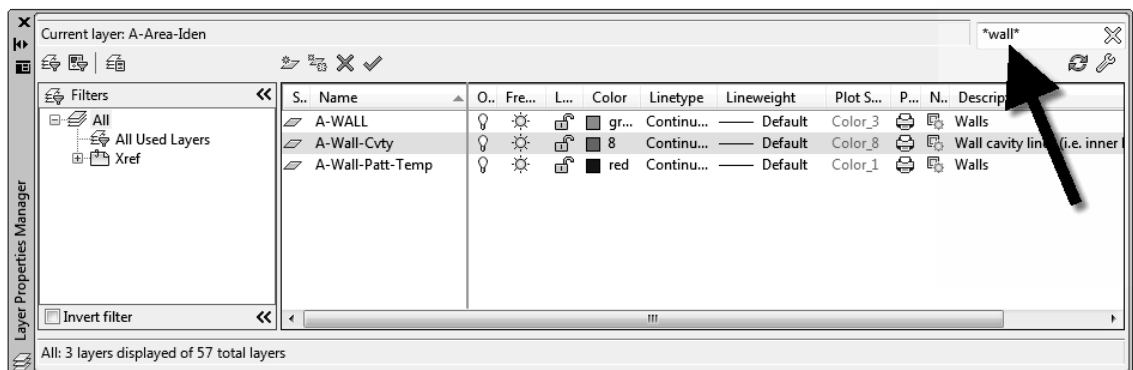

FIGURE 4-5.6   Layer Manager; search for "wall" layers

Later in this book you will learn about another feature called **Layer States**; which allows you to create "named" *Layer States* to control the visibility of *Layers*. Thus, you can quickly toggle between a presentation type drawing (i.e., minimal notes, dimensions and solid hatching in the walls) to construction documents (i.e., notes and dimensions visible, and solid wall hatching turned off).
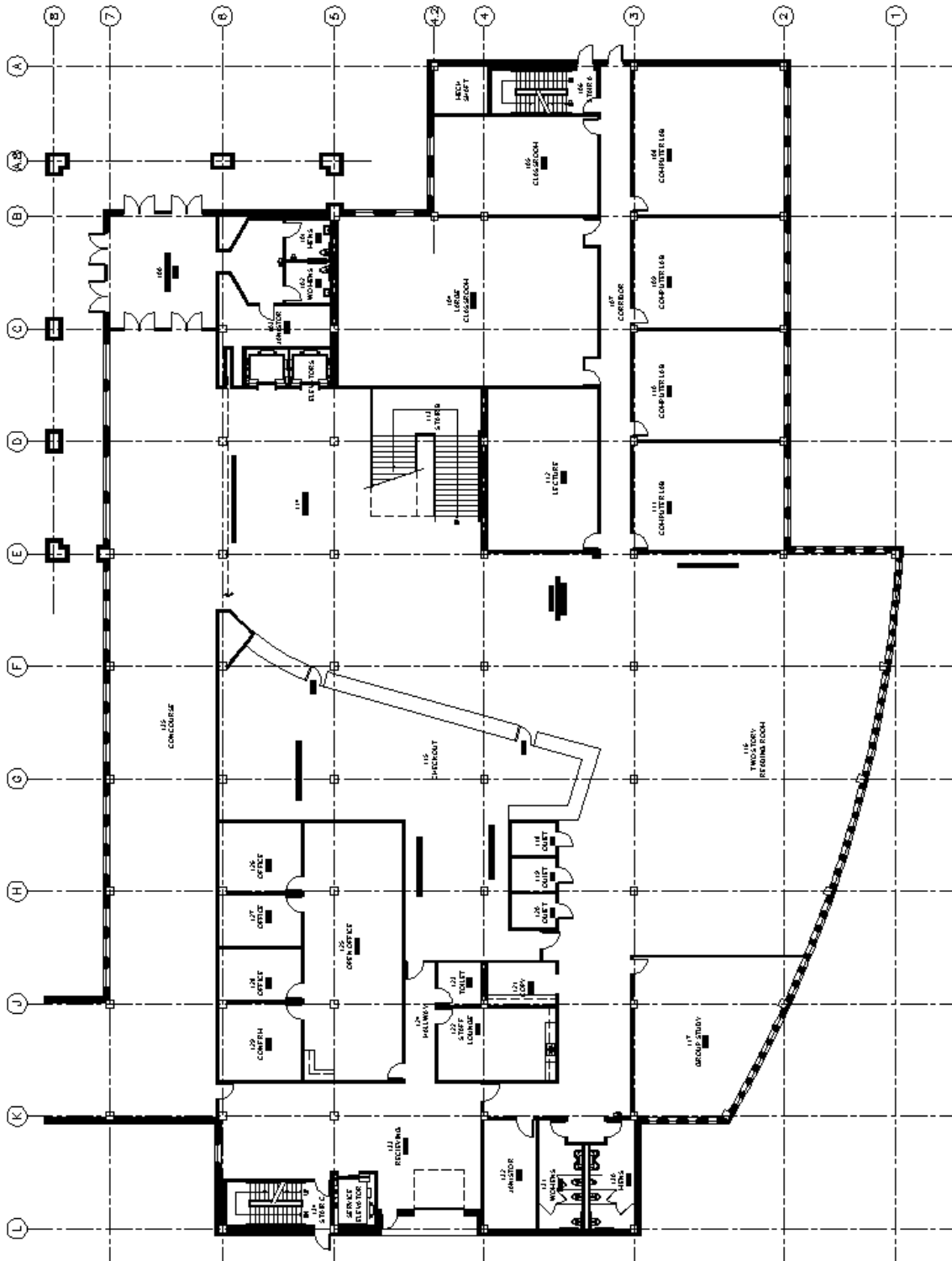
FIGURE 4-5.7   Overall floor plan with walls filled solid

Self-Exam:
The following questions can be used as a way to check your knowledge of this lesson. The answers can be found at the bottom of this page.

1. All drawing data downloaded from the Internet is perfect. (T/F)

2. Sightlines are important in toilet room designs. (T/F)

3. Right-click a Layer name to select all Layers in Layer Manager. (T/F)

4. The handrails for the stairs go on _____ layer.

5. Which hatch feature saves you from having to re-hatch an area when you stretch a

    wall to a new location? _____

Review Questions:
The following questions may be assigned by your instructor as a way to assess your knowledge of this section. Your instructor has the answers to the review questions.

1. Toilet partitions are typically drawn 1″ thick. (T/F)

2. Countertops are drawn 25″ for a 24″ deep base cabinet. (T/F)

3. Wall cabinets are shown with dashed lines in floor plans. (T/F)

4. The Layer Previous icon restores the condition of any Layers from the last time they were changed (T/F)

5. You can Copy/Paste items between drawings. (T/F)

6. In the Layer Manager, you can modify the list of layers to just show the Layers that just have "door" in them? (T/F).

7. What did you draw in order to list a room's area? _____

8. What command mends two lines together? _____

9. What command lets you freeze a Layer by selecting an object on screen?

    _____

10. You can only have one text height within an Mtext object. (T/F)
    (assuming it is not an Annotative text style)