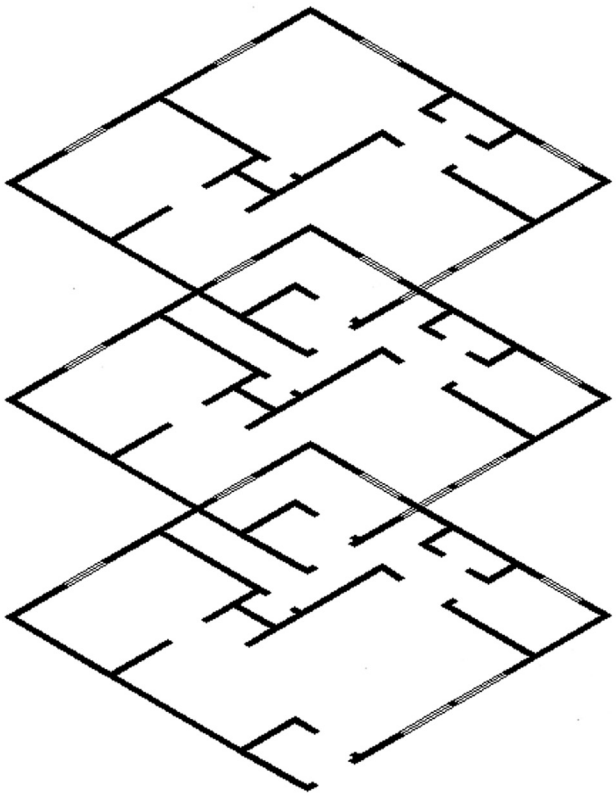
Chapter 17

External References (Xrefs)



Learning Objectives

In this chapter we introduce and thoroughly cover the concept of external references (xrefs). We specifically introduce the following topics:

- The primary reasons for using xrefs
- Loading xrefs
- Unloading xrefs
- Binding xrefs
- Updating and editing xrefs
- Layers in xrefs
- Multiple xrefs

By the end of this chapter, you will be well versed in applying this critical concept to your design work.

Estimated time for completion of this chapter: 1–2 hours.

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17.1 INTRODUCTION TO XREFS

External references, *xrefs* for short, is a critically important topic for architectural AutoCAD users and very useful knowledge for all others. Along with Paper Space (see chapter: Advanced Output—Paper Space), xrefs forms the core of advanced AutoCAD knowledge. Like many advanced topics, you need to understand fundamentally what it is and when to use it. The "button pushing," the mechanics of how to make it work, is the easy part. In this introduction, let us explain what an xref is and why there is a need for this rather clever concept, which has existed since AutoCAD's early days and is a necessary tool with any drafting software.

What Is an Xref?

As defined, an xref is a file that is electronically attached (referenced) to another, new, file. It then appears in that new file as a fully visible background, against which you can position new design work. This xref is not really part of the file, but it is merely "electronically paper clipped" to it and cannot be modified in a traditional way; it serves as only a background. The word *xref* is also an action verb, as in "I need to xref that file in."

Why Do We Need an Xref? What Is the Benefit?

The preceding paragraph was just a strict definition and may not have yet illuminated the real reason for xrefs. To see why we have this concept in AutoCAD, let us propose the following scenario.

You are designing a tall office building. It is boxy in shape (similar to the former World Trade Center towers), and as such, the exterior does not change from floor to floor. The interior, however, does. The first floor is a lobby, the second is a restaurant, the third is storage, and floors 4 through 100 are office space. In short, for a designer, once the exterior is done, the rest is all interior-space work. Therefore, going from floor to floor, the exterior design file can be xrefed in and just "hangs out," providing a background for placement of interior walls and other items. This dramatically reduces the size of each file, as a copy of the exterior is merely referenced and never part of the interior files. Got 100 floors to do? No problem; one xref file of the exterior is all that is needed if those floors do not change. To summarize: *Xref is used to reduce file size by attaching a core drawing to multiple files*.

If this were all there was, xref would be a neat trick and would have surely fallen out of favor as computer speed, power, and disk storage space increased over the years. However, the preceding was just a warm-up. The main reason for the xref concept is design changes. If you need to change the shape of the exterior walls, you need to do it only once, and the change propagates through all files using that xref. Think about the implications for a moment. In the old hand-drafting days, each floor had to be drawn separately. Imagine now a last-minute change to the exterior design. Hundreds of sheets would have been updated by hand. Score one for AutoCAD. To summarize: *Xref is used to automate design change updates to core drawings*.

Need another benefit? How about security? The xref file can be placed in a folder that is accessible only to the structural engineer and lead architect, not the interior designer or electrical engineer. Granted, this "need to know" basis for access may not be necessary, but it is good to have a way of keeping someone from shifting structural walls to accommodate the carpeting. To summarize: *Xrefs are used to enhance critical file security*.

Ideally, you are now sold on the benefits of an xref. So, how is this all actually done in practice? The xref is typically not just the exterior walls but also columns and the interior core (elevators and stairs), as those also tend to not change from floor to floor. The designer creates these files, naming them something descriptive, such as `Exterior_Walls_Ref` or `Columns_Core`. Next, the xrefs are attached together and then to the first floor file or to the first floor file individually.

The first floor file is the active file, of course, and is named `Floor_One_Arch`. At first, it is blank, showing just the xref. Then, the interior design is completed. The designer opens another blank file, attaches the same xref or set of xrefs, and names this file `Floor_Two_Arch`, and so on. Xrefs can be attached, detached, refreshed, and bound to the main drawing file. We cover all this shortly. We also cover some xref-related topics, such as layering and methods to edit xrefs in place if absolutely needed.

17.2 USING XREFS

To demonstrate the features of the xref command, we first need to have a building exterior file with which to work. You can select one of your own or one assigned by your instructor, if taking a class. Alternatively (and for good practice), draw the floor plan in Exercise 1 at end the end of this chapter. We use that floor plan for the rest of the xref discussion. In Fig. 17.1, the plan is rotated horizontally and the left corner moved to point 0,0. All the dimensions are frozen and the file is saved as `ExteriorWalls.dwg`.

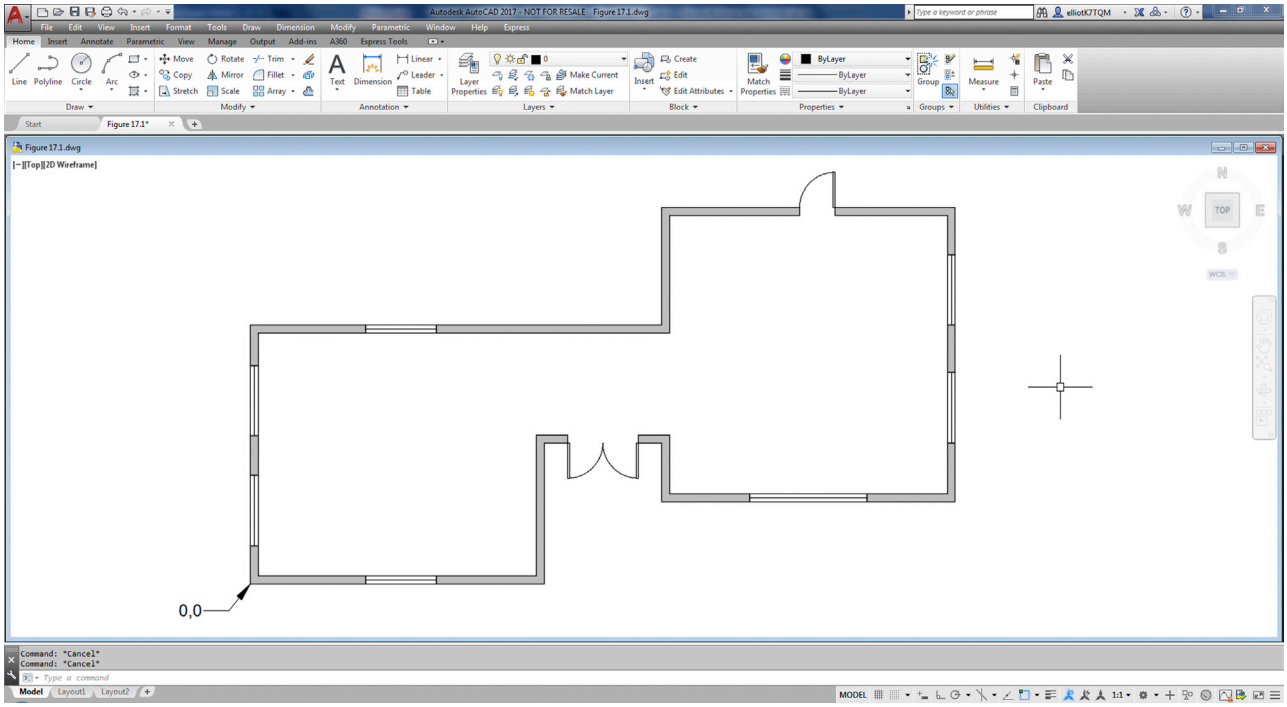

FIGURE 17.1 The Xref file.

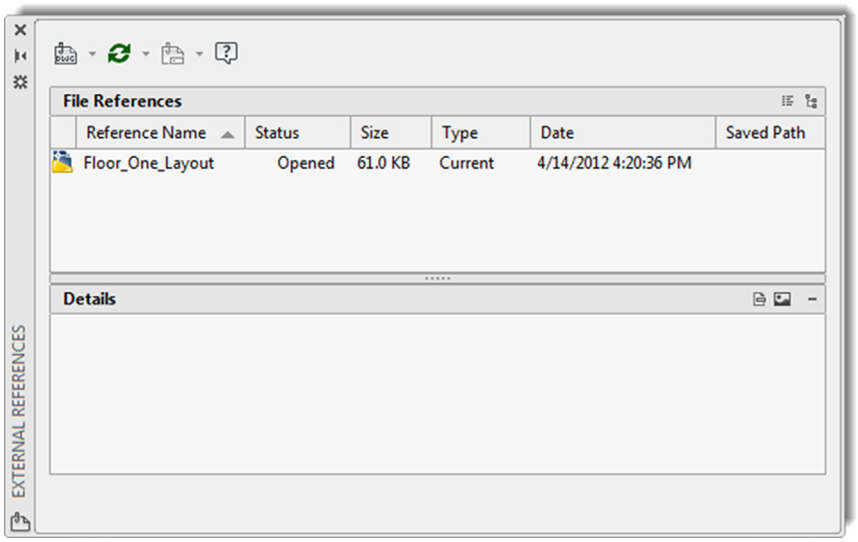

FIGURE 17.2 The Xref palette.

As of now, nothing is special about this file. We still need to xref it to the working file. Open up a blank file and save it as `Floor_One_Layout.dwg`. Then, type in `xref` and press Enter. Alternatively, you can use the cascading menu Insert→External References…. The palette in Fig. 17.2 appears. At the upper left is a white rectangle with a paper clip (hence, the earlier paper clip reference). That is the Attach drawing button. You can click on the down arrow to reveal further attachment options (Image, `dwf`, `dgn`), but we do not need those. Simply click on the Paper icon and the Select Reference File browsing window opens. Browse to find the xref file (`ExteriorWalls.dwg`) and click on Open. The External Reference insertion box appears, as shown in Fig. 17.3.

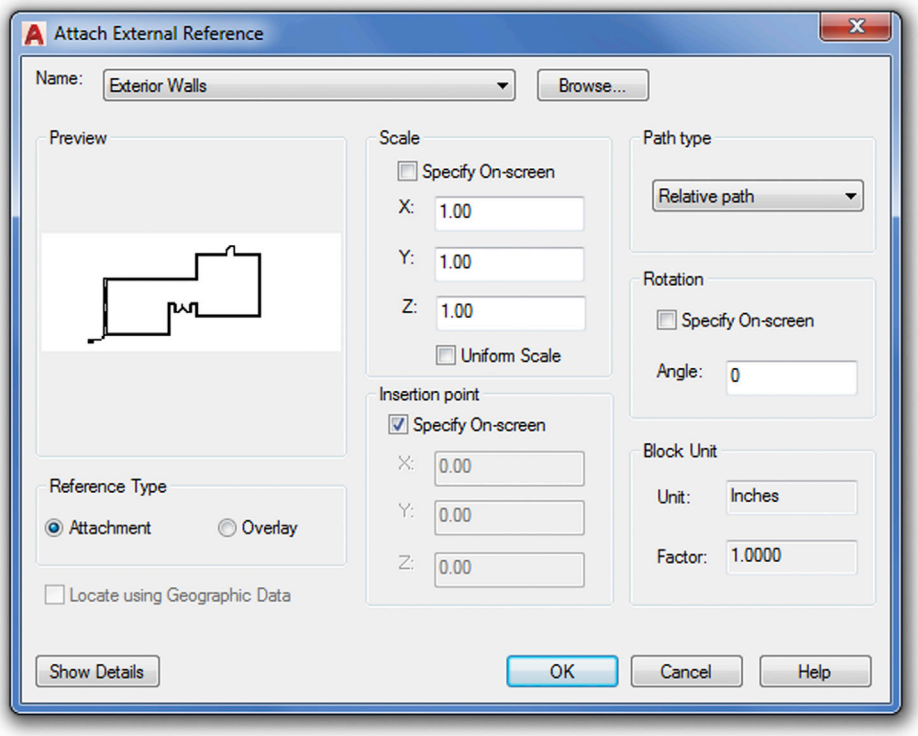

FIGURE 17.3 Attach External Reference.

Examine what is featured here, most of which should be familiar to you (such as Insertion Point, Scale, and Rotation). Uncheck Insertion Point; the fields turn from gray to white. We want the xref to insert at 0,0,0. Finally, press OK.

The xref appears with its lower left corner at 0,0,0. Zoom out to see the entire drawing if not apparently visible. Notice the new addition to the xref palette, as seen in Fig. 17.4. The `ExteriorWalls` file is visible and indicated as Loaded with the appropriate date, time, and path.

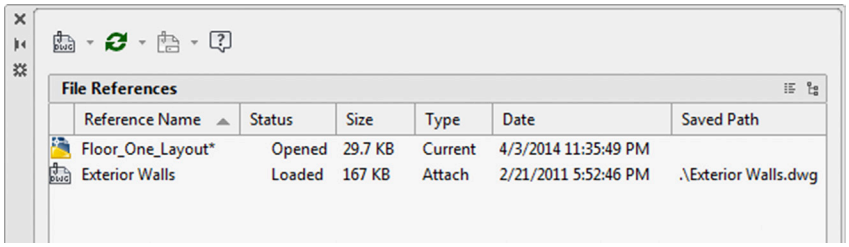

FIGURE 17.4 Xref loaded.

You can now proceed to add new design work to the file, as the xref procedure is complete. Let us skip ahead and explore some of the other available options, now that the xref is loaded. By right-clicking on the ExteriorWalls paper icon, you get access to the important menu in Fig. 17.5.

The Xref menu includes the following:

- *Open*: This option allows you to open the original xref if you wish to make changes.
- *Attach…*: This option allows you to attach another xref to your working file, using the same procedure as outlined earlier in this chapter.
- *Unload*: This option removes the xref from your working file but preserves the last known path, so if you wish to bring back the xref, you need not browse for it again but just click on Reload.
- *Reload*: The option just referred to for bringing back an unloaded xref.

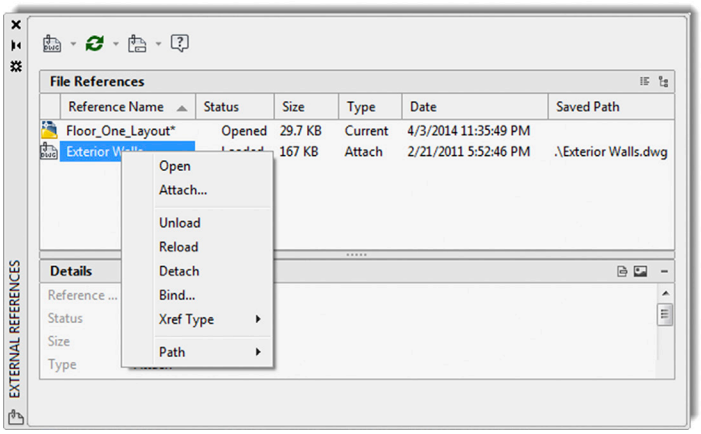

FIGURE 17.5 Xref menu.

- *Detach*: This option is more permanent and removes the xref from the working file, requiring you to browse and find it if reattachment is called for again.
- *Bind...*: This option allows you to attach a permanent copy of the xref to your working file and severs all ties with the original. The xref then becomes a block; and if it is exploded, it completely fuses together with the working file. This action is potentially dangerous and is rarely used, as you are now stuck with the xref permanently. Two possible uses include permanent drawing archiving and emailing the drawing set (so as to not forget the xrefs), though eTransmit can take care of that.

17.3 LAYERS IN XREFS

A very logical problem creeps up when using xrefs. The xref file itself has layers, often many of them. There may also be several xrefs in one active drawing. And, of course, the drawing itself may have numerous layers of its own. It is almost guaranteed that, on a job of even medium complexity, layer names can and will be duplicated. This is not allowed in AutoCAD, and some method is needed to separate layers in the xref from mixing and being confused with layers in other xrefs or the main design drawing. The solution is quite simple. In the same manner that people have first and last names to tell them apart (especially helpful if the first names are the same), so do layers when xrefs are involved.

All layers that are part of a certain xref have that xref's name preceding the layer name with a small vertical bar (and no spaces) between them. All layers that are native to the working file have no such prefix, of course.

This simple method ensures no direct duplication by having the xref file name act as the "first name" and the layer name as the "last name." An example is shown in Fig. 17.6. New layers have been added in the host file. Notice the small vertical bar in the xref layer name and the inclusion of the xref file name.

When an xref is bound to the drawing, the layer's vertical bar changes to a `$0$` set of symbols, indicating they are now bound and part of the working drawing, as seen in Fig. 17.7. You should be familiar with this if you have to examine a bound set.

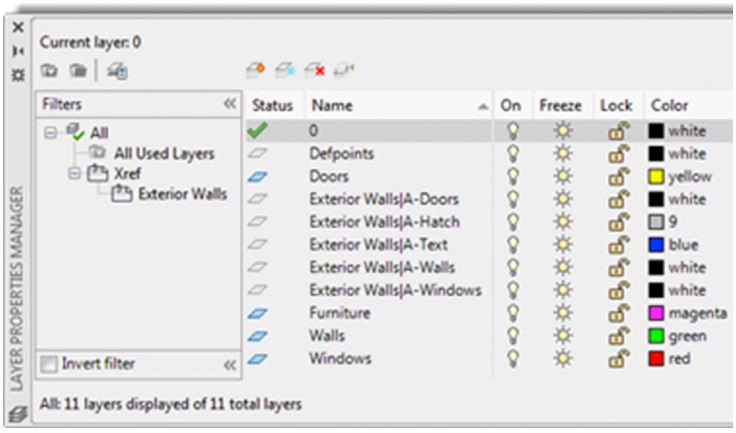

FIGURE 17.6 Xref layering.

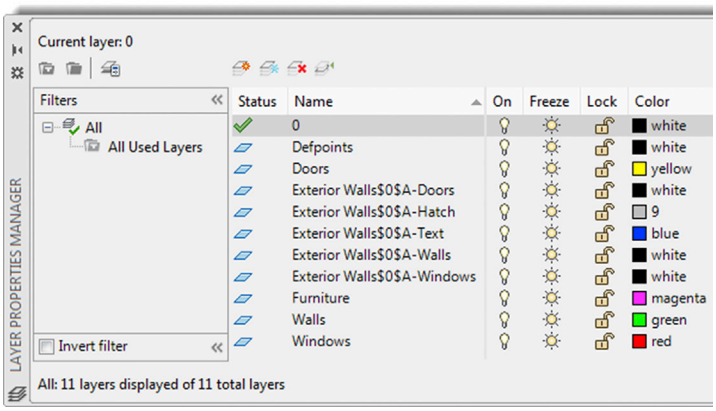

FIGURE 17.7 Xref bound layering.

17.4 EDITING AND RELOADING XREFS

At one time xrefs could not be changed in place. This means you had to open the original xref file to edit it and could not do this from the main working file. This made sense, as you generally want to limit access to the original xref, so it cannot be casually edited.

All things (and software) change, and a number of releases ago, AutoCAD started allowing xrefs to be edited in place using a technique similar to editing blocks (somewhat diminishing the security benefit of xrefs, as mentioned earlier). Let us give it a try. Double-click on any of the lines making up the xref while in the main file. The Reference Edit box appears, as seen in Fig. 17.8, with the Ribbon also changing to the (nonfunctional at this point) External Reference tab.

The xref you clicked on is listed under Reference name. Press OK and you are taken into Reference Edit mode. You may notice a few new features or items of interest:

- The xref has remained brightly lit up while everything that is on the main drawing file has faded down. This is a feature of Ref Edit. You can now clearly tell apart the xref geometry from the rest. The intensity of the fade can be adjusted under right-click, Options…, Display tab, Fade control, Xref display.

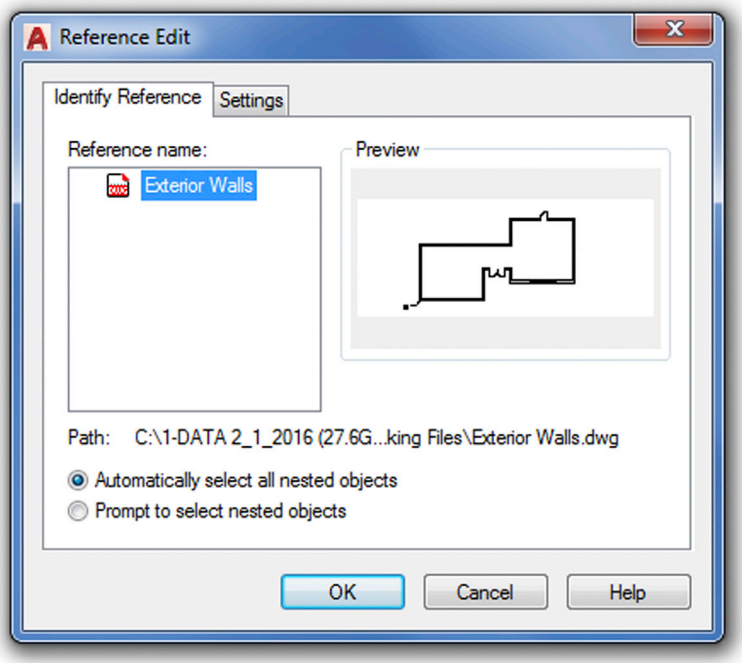

FIGURE 17.8 Reference Edit.

- The xref can now be edited in place; go ahead and change a few items around.
- A new toolbar, called *Refedit*, may appear (shown in Fig. 17.9). If it does not, bring it up via Tools→Toolbars→AutoCAD.

FIGURE 17.9 Refedit toolbar.

When you finish editing the xref, press the last button all the way to the right, Save References Edits. A warning icon appears; press OK, and you are done. The xref has been edited in place.

Just as a reminder, this procedure is only for editing the xref while you have the main working file open, and what you just did can also be done in a far simpler manner by just opening the xref as its own file (although with Ref Edit you have the advantage of seeing the internal design while editing). In fact, when changes are extensive, the designer may just open the xref itself and work on it all day, without resorting to Ref Edit. Every time the designer saves his or her work, the changes become permanent and accessible to any other designers who may be working on a job that uses that xref.

A good question may come up at this point. How do other designers know that the xref is changed so they can adjust their interior work accordingly? Many releases ago, the only way to know was for the person working on the xref file to simply tell others via a visit to their cubicle or office, phone, or email. The other users would then press Reload All References, as seen in Fig. 17.10.

Of course, you can still do this, and designers often refresh every few minutes on their own if they know someone is actively working on the xref. However, a new tool appeared recently. It is simply a "blurb" announcement that appears in the lower right corner of AutoCAD's screen, as shown in Fig. 17.11. Press the hyperlink and the xref reloads and refreshes automatically.

Another brief topic in this chapter concerns how to chain together xrefs if there are more than one of them. Some methods are suggested next.

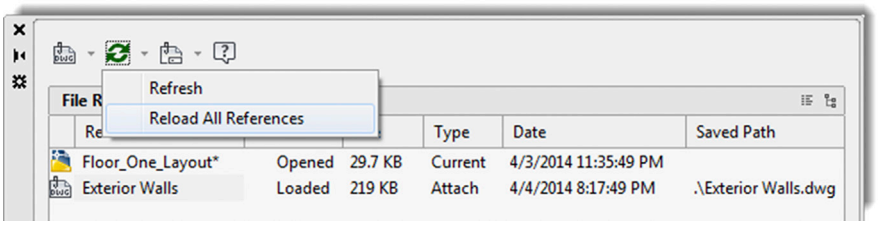

FIGURE 17.10 Reload xref.

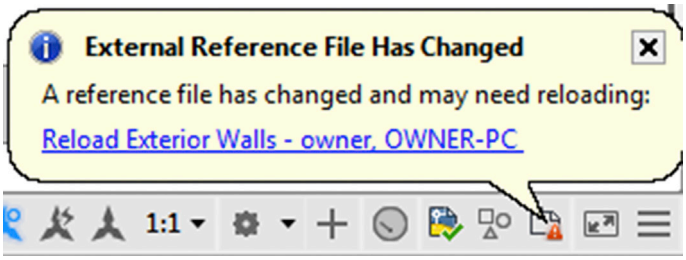

FIGURE 17.11 Reload xref announcement.

17.5 MULTIPLE XREFS

As mentioned earlier in this chapter, many complex drawings use more than one xref. Typically, you may find the exterior walls, columns, and the core as three separate xrefs. The ceiling grid (RCP) can also be xrefed in for extensive ceiling work, as can the demolition plan and many other combinations.

There are essentially two options. Let us say you work with a total of five xrefs. You can attach them one to another then to a master working file (daisy chain) or one at a time, as shown in Figs. 17.12 and 17.13.

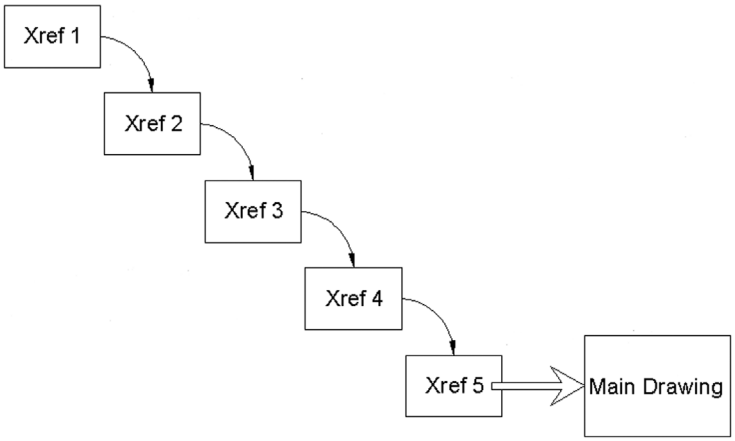

FIGURE 17.12 Multiple xref attach, Method 1.

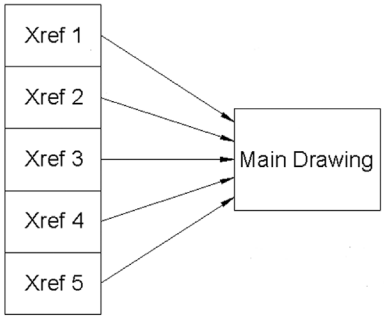

FIGURE 17.13 Multiple xref attach, Method 2.

Which method you use is up to you (there may be company policy or a convention in use at your job). Each method has minor pros and cons, and you should expect both to be used in the industry.

One final word on when not to xref, as this feature gets abused occasionally. Xrefing of title blocks, furniture, and text is not what xref is for. It is intended for major pieces of infrastructure not secondary objects. The logic behind xref in the first place is to attach objects that are not likely to change and can serve as the backdrop. Use the tool wisely.

17.6 RIBBON AND XREFS

Some xref functions can be accessed via the Ribbon, and we discuss them separately in this section. You can find them under the Insert tab, Reference panel, as seen in Fig. 17.14.

One important control is the xref fading slider you see toward the bottom of the tab. This controls the darkness of the xref and was mentioned a few paragraphs ago as also being under the right-click, Options…, Display tab. Some users prefer the xref to be dark, similar to the surrounding design, while some prefer it very light, so they clearly know what is an xref and what is the design.

Finally, the Ribbon switches to a dedicated xref tab if you click on the xref, as seen in Fig. 17.15, although there is much duplication of the previous tab's commands.

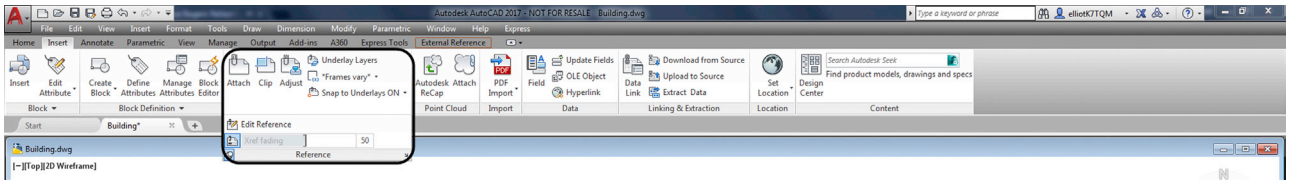

FIGURE 17.14 Xref via Ribbon, 1.

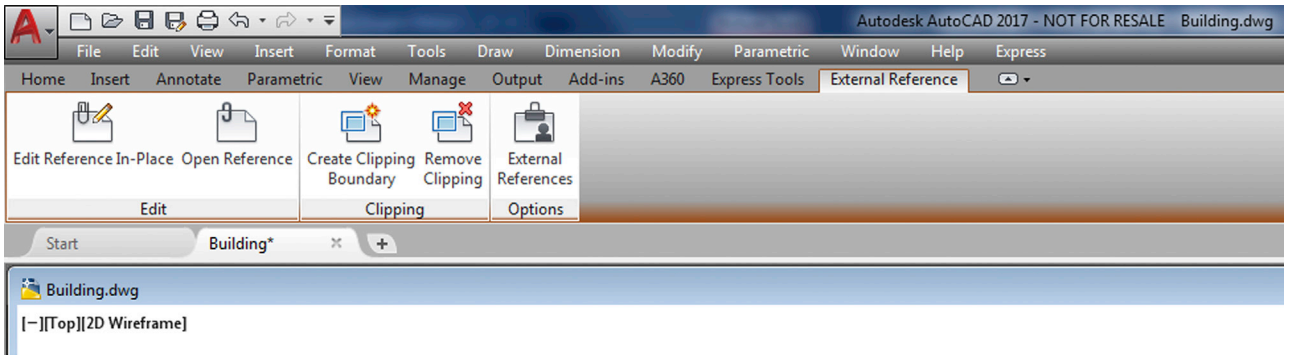

FIGURE 17.15 Xref via Ribbon, 2.

17.7 LEVEL 2 DRAWING PROJECT (7 OF 10): ARCHITECTURAL FLOOR PLAN

For Part 7 of the drawing project, we shift to the outside of the building and create some landscaping in the form of trees, shrubs, and drive-/walkways. You need some Chapter 11, Advanced Linework tools for the greenery.

Step 1. Create some appropriate layers as shown next. Freeze all layers that are not relevant to the task at hand.

- L-Driveway (Gray_8).
- L-Trees_Shrubs (Color_108).
- L-Walkway (Gray_8).

Step 2. Create the landscaping plan as seen in Fig. 17.16. You need to create plines for the borders of the driveway and the walkways. Then, after adding the hatch patterns (Sand and Brick), erase some or all of the plines. For the trees and shrubs, you need to call upon the xline and spline.

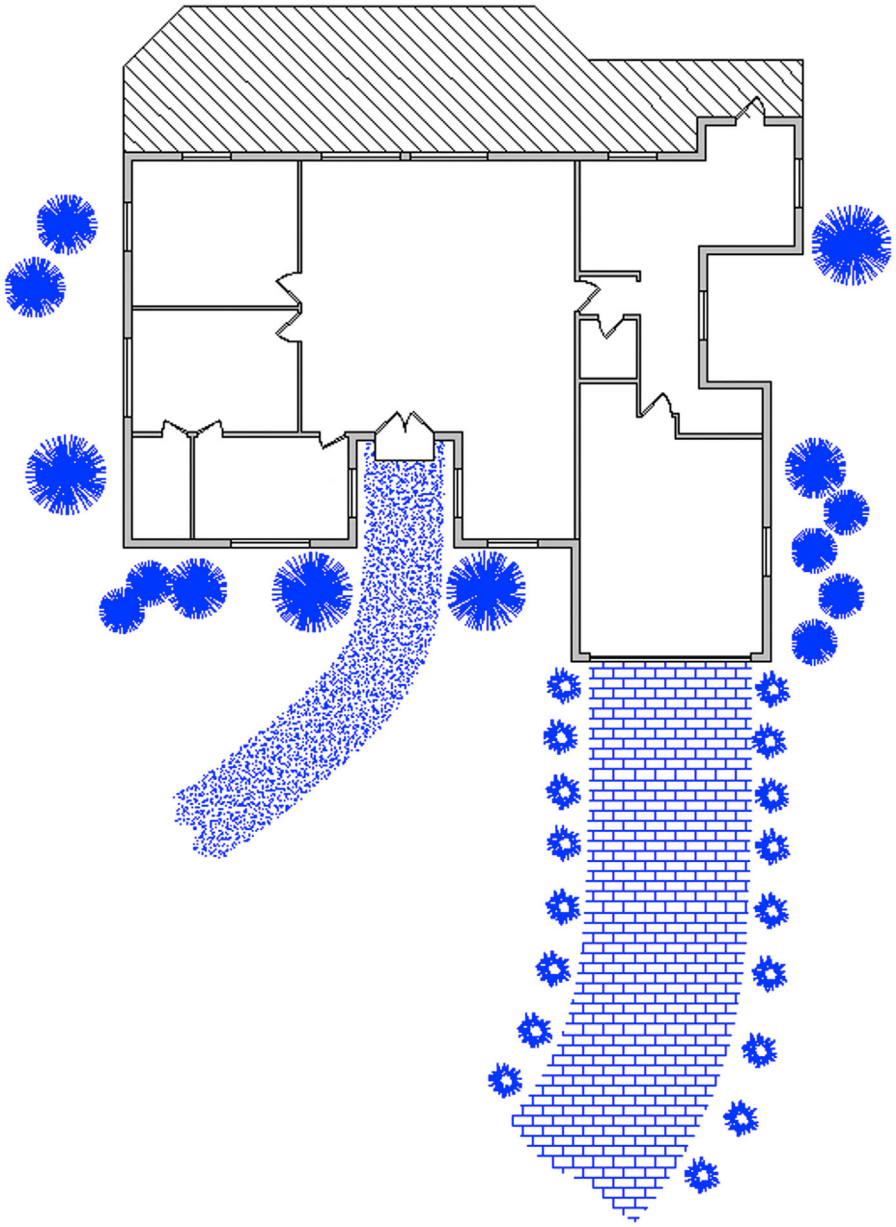

FIGURE 17.16 Landscaping plan.

17.8 SUMMARY

You should understand and know how to use the following concepts and commands before moving on to Chapter 18, Attributes:

- Xref command
- Inserting
- Detaching
- Unloading
- Reloading
- Binding
- Layers in xref
- Nesting xrefs

Review Questions

Answer the following based on what you learned in this chapter:

1. What are several benefits of xref?
2. How is an xref different from a block?
3. How do you attach an xref?
4. How do you detach, reload, and bind an xref?
5. What do layers in an xrefed drawing look like?
6. What do layers look like once you bind the xref?
7. What are some nesting options for xref?

Exercise

1. Draw the following floor plan to practice the xref command. (Difficulty level: Easy/Moderate; Time to completion: 45–60 minutes.)