Importing and Coordinating Models

It's amazing that we're up to Bonus Chapter 6, and yet I'm sure many readers are still unclear about how BIM fits in here. Yes, most of the previous chapters showed how you benefit from BIM when you change an item in one place and it changes in another—yada, yada, yada .... But you were probably sold on the whole "coordinating with your consultants" thing back when you were considering purchasing the Autodesk® Revit® Architecture software. Well, here we are. It's time to tackle that mystical ideology that has put our industry in a loose headlock.

- **Linking a Revit Structure model**
- **Activating Copy/Monitor**
- **Running interference detection**
- **Importing and exporting CAD formats**

Linking a Revit Structure Model

The first section of this chapter will focus on the actual event of importing a Revit Structure model. As you start the process, you'll see that this procedure isn't unfamiliar if you have any CAD background whatsoever. If you don't have a CAD background, I think you'll find these procedures to be intuitive enough to get through importing Revit models.

As you proceed into design development, you must get your structural engineer on board. This consultant may be an external or an in-house resource. Either way, this individual will have a different model with which you need to coordinate.

This section will focus on the procedures involved with importing a Revit Structure model. We'll also cover the concept of creating a live monitoring system with the structure as well as interference detection.

NOTE **Metric users should not type in *mm* or other metric abbreviations when entering amounts suggested in the exercises. Revit will not accept such abbreviations. Simply enter the number provided within the parentheses.**

To get started, open the model on which you've been working. If you missed the previous chapter, go to the book's web page at `www.sybex.com/go/revit2017ner`. From there, you can browse to the `BC6` folder and open the `NER-BC6.rvt` file. You'll also need to locate the model called `NER-BC6_STRUCTURAL.rvt`. Save both files in a location where you can retrieve them.

The objective of the following procedure is to import and link a Revit Structure model. Follow these steps:

1. In the Project Browser, go to the Level 1 floor plan.
2. Delete every structural column. (Keep the canopy framing intact. Don't delete the beams and columns in these two areas.)

NOTE **Why are you deleting these structural members you worked so hard to add? Because the structural consultant laid out their grid based on yours. You'll copy their grid back in and monitor any movement that may occur throughout the life of the project. As far as the columns go, you're going to use the structural engineer's columns for your elevations, plans, and sections from this point forward.**

3. On the Link panel of the Insert tab, click the Link Revit button, as shown in Figure BC6.1.

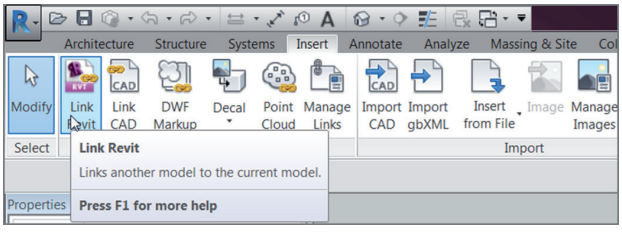

FIGURE BC6.1: **The Link Revit button on the Link panel of the Insert tab**

4. Browse to the `NER-BC6_STRUCTURAL.rvt` file, but don't click Open just yet.
5. Select the file.
6. At the bottom of the dialog, you have a choice of Positioning. Select Auto – Origin To Origin, as shown in Figure BC6.2.

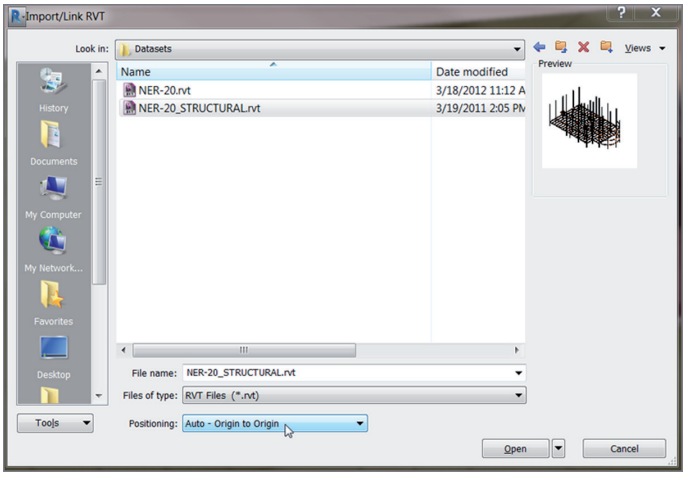

FIGURE BC6.2: Pay attention to the choices provided before you click Open.

7. Click Open. Your structural model is now linked.
8. Because this structural model was created independent of your architectural model, you need to align the structural grid with the architectural grid. Use the Align function to do this.
9. Open the 3D view East Entry Corridor.

You can now see the wood framing the structural engineer added to support the cantilevered slab, as shown in Figure BC6.3.

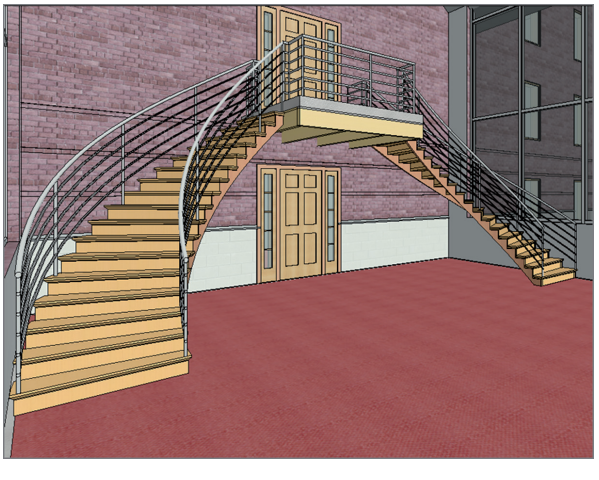

FIGURE BC6.3: The supporting framing under the cantilevered slab at the east link

Already you're seeing the benefits of a collaborative model, and you've done nothing more than insert one model into another. This isn't new technology, and you're certainly not doing anything profound. The real benefit comes from how you can keep track of what the structural model is doing underneath your model. You can copy items from the structural model and then monitor any changes made from the linked model. This is the definition of BIM.

Activating Copy/Monitor

I can almost sum up BIM in one command: Copy/Monitor. I hate to break down the most important acronym in our industry since CAD into such simple terms, but BIM is the process of monitoring and tracking change, and that process starts right here.

In the next procedure, you'll copy the structural grids and apply a monitoring system that will alert you when the grids have moved. Although this chapter will focus solely on copying and monitoring the grids, your takeaway will be the experience required to recognize the procedure and the importance of this function.

To create a copying and monitoring system, follow these steps:

1. Go to the Level 1 floor plan.
2. On the Coordinate panel of the Collaborate tab, select Copy/Monitor ➢ Select Link, as shown in Figure BC6.4.

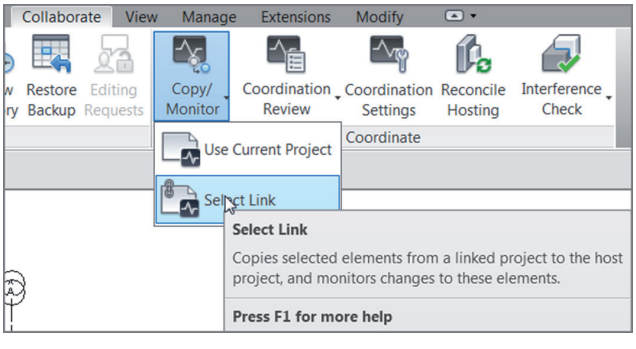

FIGURE BC6.4: The Copy/Monitor button on the Coordinate panel of the Collaborate tab

3. Hover your pointer over one of the grids. You see an outline of the Revit Structure model that you've linked in. Pick the grid (see Figure BC6.5).

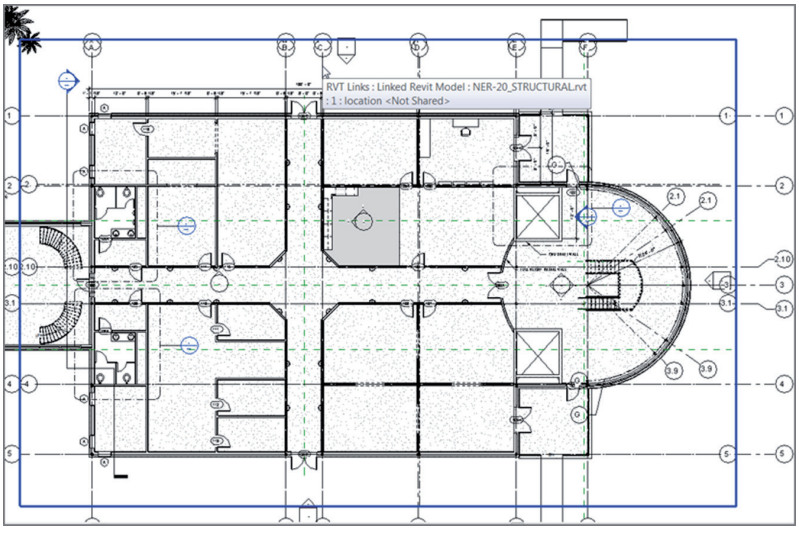

FIGURE BC6.5: Selecting the link to Copy/Monitor

4. On the Copy/Monitor tab, click the Copy button, as shown in Figure BC6.6.

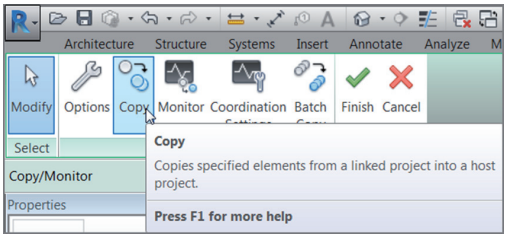

FIGURE BC6.6: Clicking the Copy button

5. On the Options bar, select the Multiple option.
6. While pressing the Ctrl key, select all the grids in the linked model.
7. When you're finished, click Finish on the Options bar, as shown in Figure BC6.7.
8. You may get a warning saying, "The following types already exist but are different." Close the warning. Your grids should look like Figure BC6.8.

It's often overlooked, but you *must* click Finish on the Options bar or the copying and monitoring process won't take effect.

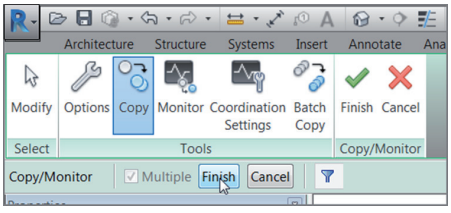

FIGURE BC6.7: The Finish button on the Options bar

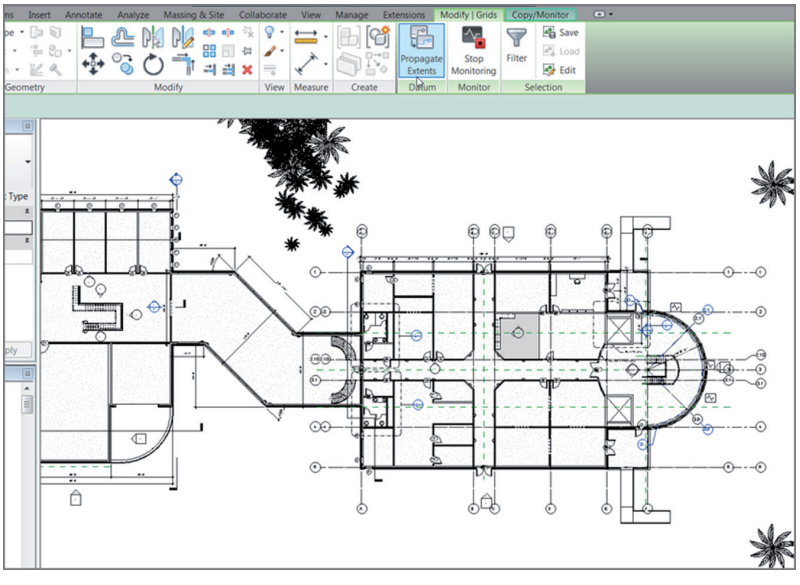

FIGURE BC6.8: The copied grids

9. Close out of any warnings stating that new items have been renamed. This is inconsequential information.

10. Click Finish, as shown in Figure BC6.9.

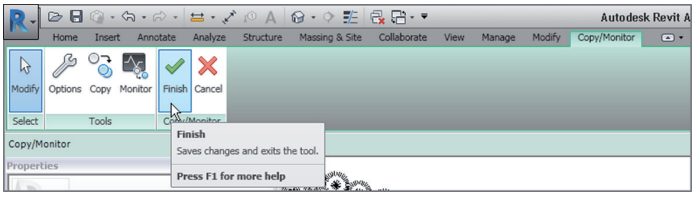

FIGURE BC6.9: Clicking Finish

You now have a relationship with the structural model. Next, you'll put this relationship to the test and generate a coordination alert. I suppose you could say that the honeymoon is over!

Coordination Alert

Suddenly you've been thrust into a completely different way of working. You have a structural model inserted into your architectural model that will bark at you every time something changes. There's nothing wrong with that. Sure, occasionally there will be some annoyances, but these irritations are a small concession for being truly tied in with the structure.

When something changes in the structural model that is involved with an active monitor, you'll be alerted. This alert will occur either when you open your model or when you reload the linked Revit file.

To review the coordination alert, follow this procedure:

1. Save and close your model.
2. Open the `NER-BC6_STRUCTURAL.rvt` model.
3. Open the Level 1 structural view, and rename grid A to z, as shown in Figure BC6.10.

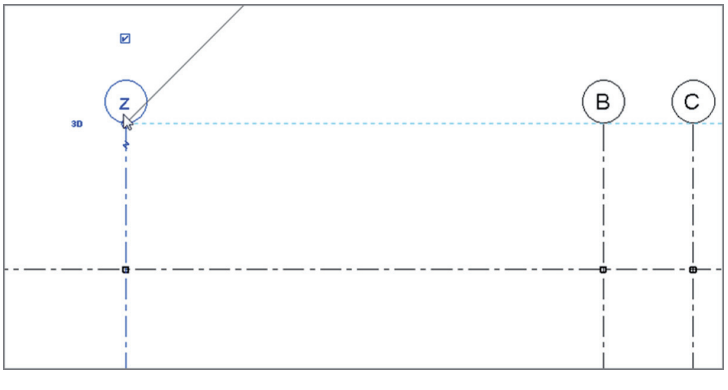

FIGURE BC6.10: Renaming grid A

4. Save the model and close it.
5. Open the architectural model. You may see the warning shown in Figure BC6.11.
6. Click OK to continue opening the model.

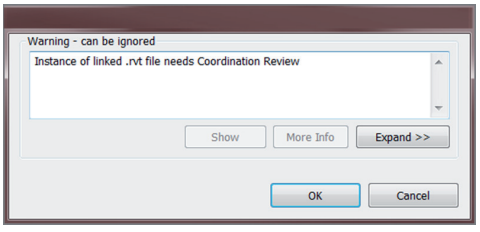

FIGURE BC6.11: Coordination alert

7. Go to Level 1.
8. Select the link. (You may have to hover your mouse over one of the grids and press the Tab key.)
9. On the Monitor panel of the Modify | RVT Links tab, click the Coordination Review button, as shown in Figure BC6.12.

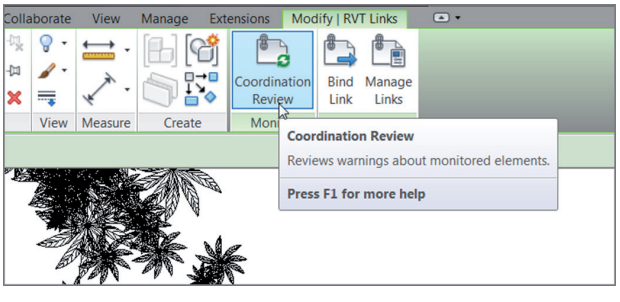

FIGURE BC6.12: The Coordination Review button on the Monitor panel of the Modify | RVT Links tab

10. In the Coordination Review dialog, expand the Grids category (under the New/Unresolved category), as shown in Figure BC6.13.
11. Expand the Maintain Name category.

TIP The category that says Grid Moved is the actual alteration that occurred in the structural model. Finally! Somebody is telling us what they changed without fear of us getting mad at them.

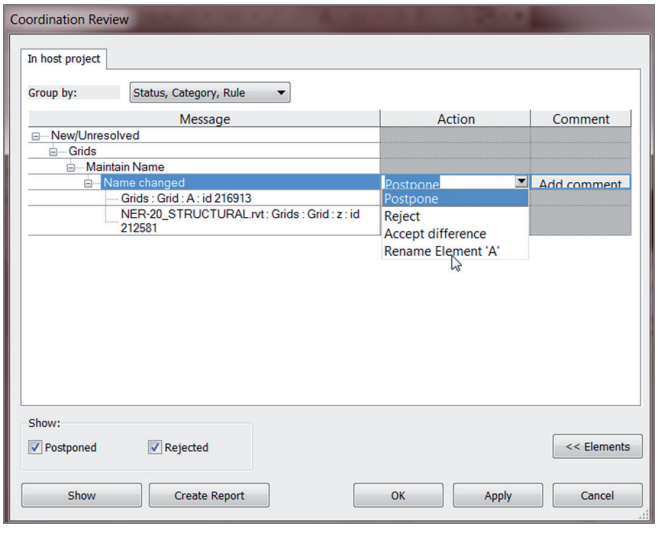

FIGURE BC6.13: Telling Revit to rename the grid automatically

12. To the right of the Name Changed category is the Action column. Click into the cell that says Postpone, and look at the list. You'll see four categories.

    Reject Reject postpones the change. Each time you run a coordination review, this instance is listed as rejected. You'll have a chance to modify the instance at a later date.

    Accept Difference Accept Difference basically skips the error. You can change it at a later date.

    Rename Element 'A' This choice takes action. If the difference is the name (which it is in this case), Revit renames the grid. If the grid moves or if it's deleted, Revit moves or removes the grid for you. (Basically, any necessary modification can be made automatically right here.)

    Postpone This allows you to wait until later to make a decision.

13. Select Rename Element 'A'.

14. Click Apply.

NOTE You can also add a comment pertaining to the change. Typically, it's a note to yourself, but in some situations, you'll need such a comment when you're involved in friendly discussions about who started a chain of events.

15. Click the Create Report button at the bottom of the dialog.
16. Save the HTML file to a location where you can find it.
17. Click OK in the Coordination Review dialog. (Notice that grid A is changed.)
18. Open Windows Explorer, find the HTML report, and open it. It's an uneditable report about the coordination effort that just occurred.
19. Close the report.
20. Save the model.
21. To check whether there are any more issues, select the structural link, and click the Coordination Review button on the Modify | RVT Links tab, as shown in Figure BC6.14.

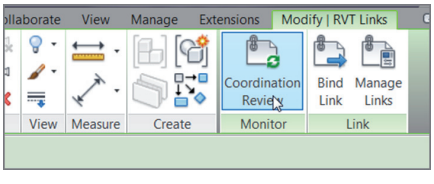

FIGURE BC6.14: Click the Coordination Review button.

22. Select the linked structural model. The report should be empty.

A coordination report is an excellent way to track changes, but you're alerted to these changes only if you have the elements copied and monitored. How are you supposed to know if other elements are colliding with one another? This question is answered by using the Interference Detection function built into Revit.

Running Interference Detection

What came first, the chicken or the egg? That's a tough call. Another tough call is whether the beam comes before the duct or wall. Ask a structural engineer and they will answer that the beam does in fact come before the wall, the door, or any other architectural appointment. On the other hand, an architect will ask

the structural engineer to move or eliminate a structural component. But the fact is, if the architect and the structural engineer are having this argument, that means they know there is an interference, and their disagreement about the chicken and the egg is actually a good thing.

You can use interference detection in Revit to keep the contractor from asking such questions. If the contractor is asking questions, then you have a problem, don't you? It means a collision has occurred that nobody caught. Don't worry—you can still have the chicken argument, only now it's called litigation.

To use interference detection, you don't have to do anything more than open a single dialog. There, you can select specific elements that you're worried about colliding. And in true Revit form, you can create a report and even zoom in on the issue.

The objective of the following activity is to find some clashes between the architectural model and the structural model:

1. On the Coordinate panel of the Collaborate tab, select Interference Check ➢ Run Interference Check, as shown in Figure BC6.15.

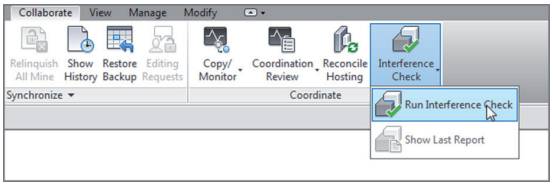

FIGURE BC6.15: Run Interference Check on the Coordinate panel of the Collaborate tab

2. In the panel to the left of the Interference Check dialog that opens, select Current Project as the Categories From setting.
3. Select Doors and Stairs from the list, as shown in Figure BC6.16.
4. In the Categories From menu, select the `NER-BC6_STRUCTURAL.rvt` file.
5. Select Structural Framing and Structural Columns (see Figure BC6.16).
6. Click OK.
7. The Interference Report dialog shows that you have a stair issue. Expand the first Structural Framing category under Stairs, and click Stairs ➢ Stairs: Assembled Stairs.

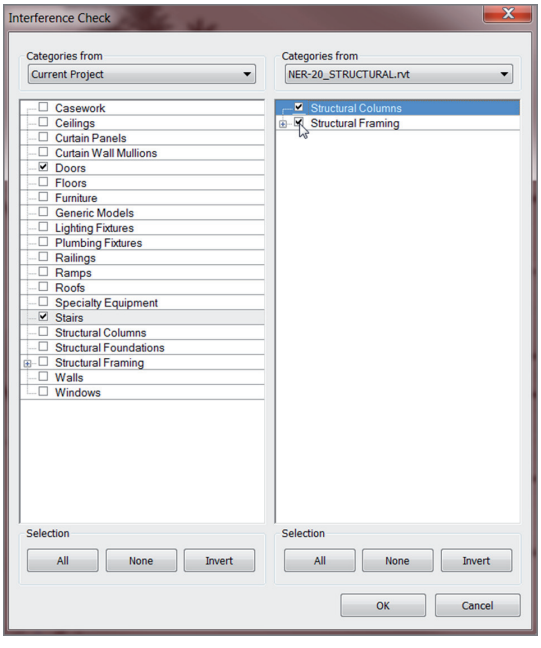

FIGURE BC6.16: Selecting the components to find in the interference report

8. At the bottom of the dialog, click the Show button (see Figure BC6.17). You may have to go through a couple of good views to find the interference (by clicking the Show button). Get used to this.

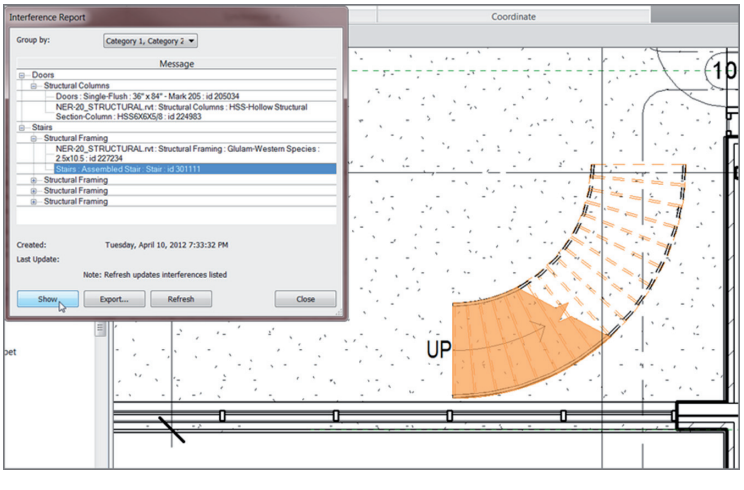

FIGURE BC6.17: The offending items are discovered!

9. You can set the visual style any way you want it, but you may have to hide some items (as I did) to see the collision.
10. Revit zooms right in on the issue. Click the Export button.
11. Save the report in the same directory as the coordination report.
12. Click Close.

What Do You Mean, Close? We Didn't Fix Anything!

Yes, that's right—you only identified the issue. Revit doesn't breach another model to fix your consultant's work. It does, however, give you a specific, detailed report for your meeting. Remember, using Revit doesn't negate the need for open discussion during a project.

That is some good stuff. Lucky for you, your consultants are all up and running on Revit. Oh, they aren't? What kind of world are you living in?

It's true. Your consultants won't all be on Revit. If you're lucky, 1 in 10 uses Revit in such a capacity that they're ready to share a model with you. This is OK—don't panic. You're still in a great position. You can easily import from AutoCAD (or MicroStation), and you can export your model just as easily.

Importing and Exporting CAD Formats

The first process we'll delve into is importing an AutoCAD structural floor plan. Although you've imported CAD in this book numerous times, you have yet to do so in the context of a coordinated floor plan. The mindset for this is a little different. And why is that? Because you now care about where this AutoCAD drawing lands in relation to your model; you care also about maintaining that relationship.

For the CAD file used in the following procedure, go to the book's web page, browse to the `Chapter BC6` folder, and find the `NER-BC6_STRUCTURAL.dwg` file. Save this file in a location where you can retrieve it.

Now, let's import an AutoCAD 2D floor plan and pin down its coordinates. Follow these steps:

1. Go to the Level 1 floor plan.

2. Right-click the Level 1 view in the Project Browser, and click Duplicate View ➢ Duplicate With Detailing, as shown in Figure BC6.18.

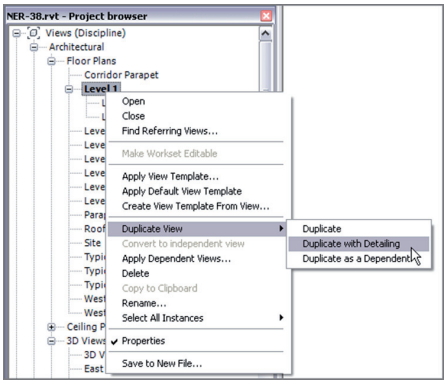

FIGURE BC6.18: Duplicating the view

If you have view references, Revit won't paste them into the new view. Click Delete Element(s), and Revit will let you proceed.

3. Rename the new view **Level 1 CAD Coordination**.
4. Open the new view.
5. Type VG (for Visibility Graphics).
6. Click the Revit Links tab.
7. Uncheck the `NER-BC6_STRUCTURAL.rvt` model.
8. Click OK.
9. On the Link panel of the Insert tab, click the Link CAD button, and then browse to the location where you saved the `NER-BC6_STRUCTURAL.DWG` file.
10. At the bottom of the Link CAD Formats dialog, select the Current View Only check box.
11. Set Colors to Black And White.
12. Set Layers/Levels to All.
13. Set Import Units to Auto-Detect.
14. Set Positioning to Auto – Origin To Origin (see Figure BC6.19).
15. Click Open.

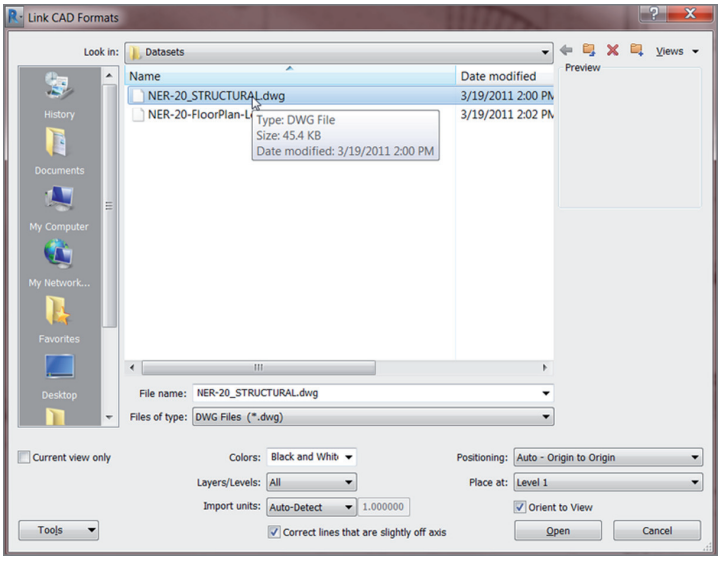

FIGURE BC6.19: Configuring the link

16. On the View Control bar, click the Wireframe button so you can see the AutoCAD structure, as shown in Figure BC6.20.

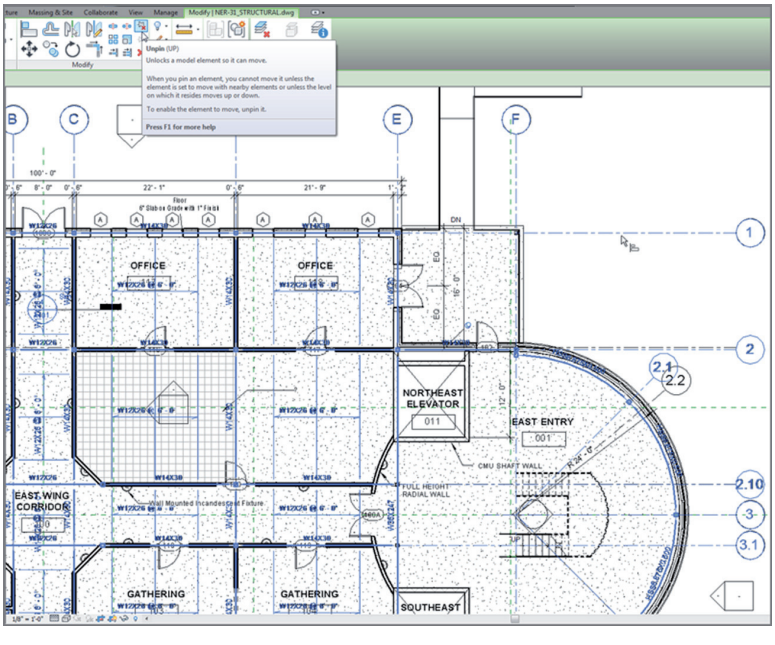

FIGURE BC6.20: Unpinning and aligning the reference

17. As you can see, the underlay isn't positioned correctly. Select the linked CAD, and unpin it (see Figure BC6.20).

18. Align column lines A and 1.

The next step is to make sure the coordinates in the Revit model stay true in the DWG file. With one simple procedure, you can publish the coordinates of the Revit model to the DWG file to ensure accuracy while importing because you had to move the link. Follow these steps:

1. On the Project Location panel of the Manage tab, click Coordinates ➢ Publish Coordinates, as shown in Figure BC6.21.

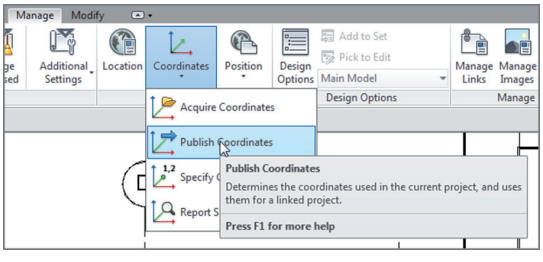

FIGURE BC6.21: Publishing the coordinates

2. Select the AutoCAD link by left-clicking it in the view.

3. On the Site tab of the Location Weather And Site dialog, click the Duplicate button.

4. Call the new location **Revit Position**, and click OK.

5. Click OK.

6. Press Esc, and then select the AutoCAD link.

7. In the Properties dialog, verify that Shared Site is now Revit Position.

8. Save the Revit model.

9. After you save the Revit model, you're prompted to save the new coordinates in the DWG file. Click the Save button, as shown in Figure BC6.22.

So that's importing. Now, suppose you need to send your model to clients and consultants who don't have Revit. This can be addressed quickly and deliberately.

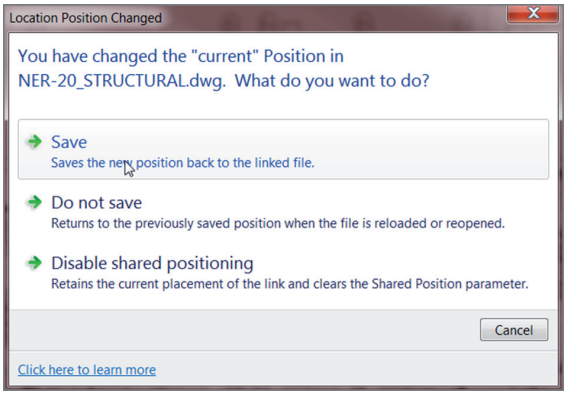

FIGURE BC6.22: Saving the coordinates to the AutoCAD file

Exporting a Model to CAD

For some of you, this is a nice-to-know subject. But for most of you, this is a need-to-know subject. Taking the plunge into Revit may be something you're doing alone. Even if you're using Revit, you may still need the ability to provide CAD drawings based on your models.

This section will focus on the process of exporting your Revit model to both 2D and 3D CAD.

Exporting a 2D Model

Most of the time, your deliverable to your clients will be a 2D model. If your consultants aren't on Revit, usually they aren't using 3D CAD either. The 2D CAD format is the lowest common denominator. Not that a 2D model is bad—it means you need to export your model in a way that the client can pick it up and run with it.

The objective of this procedure is to export your model to a 2D AutoCAD drawing file. Follow these steps:

1. In the Project Browser, open the Level 1 floor plan.
2. Click the Application button, and select Export ➢ CAD Formats ➢ DWG Files, as shown in Figure BC6.23.
3. Click the [...] button to the right of the Select Export Setup drop-down, as shown in Figure BC6.24.
4. You have all sorts of CAD options. Click OK in this dialog.

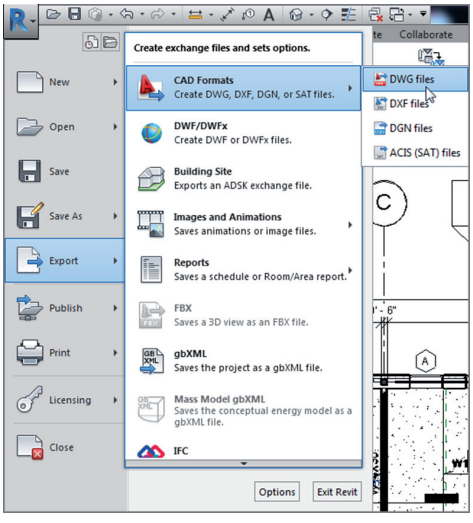

FIGURE BC6.23: Exporting the model to CAD

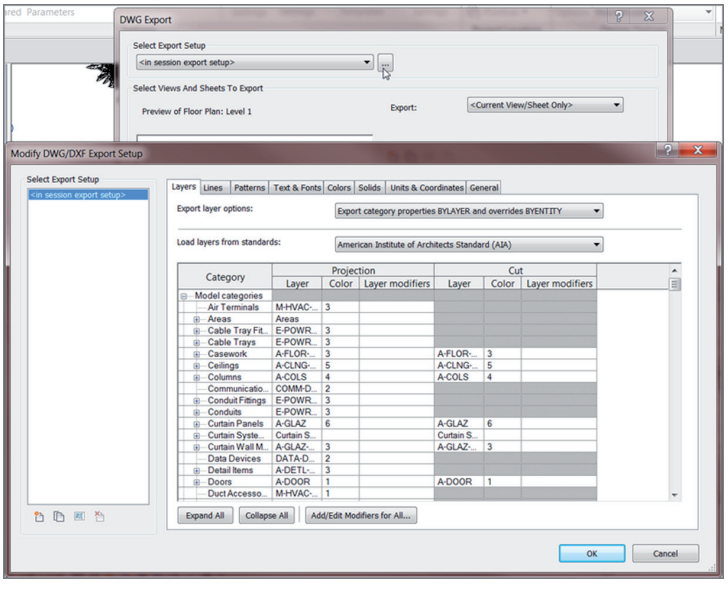

FIGURE BC6.24: Look at all the CAD choices!

5. Click OK.
6. Click the Next button, and save the file. You can open it and check it out if you want.

Now that you can export to a flat 2D file, it's time to export your model as a full 3D entity. The process is similar to exporting as 2D.

Exporting the Model to 3D CAD

It's a shame to dumb down a 3D model to flat 2D CAD. It feels as though you're taking a step backward each time you do it. When you find yourself in a situation where your consultants are using CAD but are using 3D modeling, you can give them the gift of 3D. Follow these steps:

1. Go to the Default 3D view.
2. Select Export ➢ CAD Formats ➢ DWG Files.
3. Set the Export option to Current View/Sheet Only.
4. Click the Next button.
5. Find a place to save the 3D model, and click OK.
6. Save the model.

The most important step in exporting to a 3D CAD format is to be in a 3D view.

As you can see, it's not a difficult process, but it's important to know. You'll often find yourself exporting all your hard work and data to a lesser CAD format as you wait for the rest of the industry to catch up to you!

Are You Experienced?

Now you can...

- ✔ **import a Revit Structure model**
- ✔ **copy and monitor the Revit model**
- ✔ **run interference checking on a linked Revit model**
- ✔ **export a Revit model to CAD formats (2D and 3D)**