information that can be manipulated in both a positive and a negative way. The following is a basic example in which you'll create a floor schedule in the Example-50% DD.rvt:

1. Open Example-50% DD.rvt.
2. Type `vg` to open the Visibility/Graphic Overrides window.
3. Deselect all model categories except for Floors and click OK (Figure 4.27).

![Visibility/Graphic Overrides for 3D View](image)

**Figure 4.27** In the Visibility/Graphic Overrides window, deselect all categories except for Floors.

4. Select the Manage tab in the top ribbon. Then select Project Units and make sure the format for Volume is cubic yards (CY) and not cubic feet (Figure 4.28).

5. Now select the slab on grade 6" Concrete Basement Floor and click Edit Type in the Properties window (see Figure 4.29).
Figure 4.28 Project Units window
In the Type Properties window, you'll start to see the Information component of BIM. Notice at the top it tells you the Family (System Family: Floor) and Type (6" Concrete Basement Floor). Within a Revit family, you have type and instance properties. A type property relates to all the 6" Concrete Basement Floors for the entire project. An instance property relates to that particular instance of the 6" Concrete Basement Floor. You can see some of the instance properties on the left-hand side of Figure 4.29. This would include area, volume, thickness, and so forth. Those are unique to the slab you selected, so they're an instance. For estimating, you're typically more interested in the type properties, because you want to take off all of the 6" Concrete Basement Floors for the entire project.

Look at the Identity Data section in the Type Properties window, and you'll see a Cost field. This is where you'll enter a unit cost for an item. Some companies have cost history data that they use for estimating a project, but I used The Gerdian Group's RSMeans to create a unit cost (you can download a free trial at http://rsmeansonline.com). In RSMeans, I specified 3000-psi ready-mix concrete with a 5% waste factor and used a direct chute for the placement. The cost came out to roughly $140/cy. Once you've filled in the Cost field for the 6" Concrete Basement Floor, click OK and repeat the same process for the elevated slabs. You only have to do one, because you're adjusting the type property and not the instance property.

After you've entered the unit costs for both types of floors, select the View tab on the ribbon. Click the Schedules menu and select Schedule/Quantities to open the New Schedule dialog box (Figure 4.30).

Figure 4.30 The New Schedule dialog box

View: Schedule/Quantities

Category: Concrete Takeoff

Filter: Show all

Items: Fire Alarm Devices, Air Ducts, HVAC Zones

Schedule: New Construction

OK, Cancel, Help
7. Click Floors, and enter Concrete Takeoff in the Name text box; then click OK.
8. In the Schedule Properties window, scroll through the Available Fields list box and add the parameters Area, Cost, Family And Type, and Volume.
9. Click Calculated Value to open the Calculated Value dialog box. Here you can create formulas with the added properties.
10. Enter the name Concrete and Placement.
11. In the Formula field, click the ellipsis to open the existing properties.
12. Create the formula shown in Figure 4.31.

Figure 4.31 Creating the Concrete and Placement formula

13. Repeat steps 9-11 and create a calculated value named Finishing. For Finishing, use the formula Area*$.44/1sf$ (I used RSMeans to obtain the finishing unit cost).
14. Create a calculated value named Total Cost with a formula Concrete and Placement+Finishing.
15. In the Schedule Properties window, select the Sorting And Grouping tab and click the Grand Totals option (Figure 4.32).
4.32 Select the Grand Totals option.

Click the Formatting tab and select the Concrete And Placement field. Select the Calculate Totals option.

Click the Field Format button. Enter the settings shown in Figure 4.33 and click OK.

Repeat steps 16-18 for both Finishing and Total Cost.

4.33 Enter the field formatting settings shown here.

Once you've completed the formulas, click OK to generate the schedule, shown in Figure 4.34.
Figure 4.34 The Concrete Takeoff schedule

You can follow the same process for every element in the model to create a total project cost. The first time you create a schedule, the process may seem a bit cumbersome, but once you’ve done it a couple of times, you’ll find it easy. When you leverage the data in a positive way, the results can be very powerful and efficient.

Now let’s look at how the data can be manipulated in a negative way:

1. Go back to the 3D view by clicking on the house icon at the very top left of the screen or minimizing the schedule view.

2. Select the slab on grade (6” Concrete Basement Floor) and select Edit Type in the Properties window (Figure 4.29).

Note the instance properties.

3. Click the Rename button.

4. Change the name to 12” Concrete Basement Floor.

5. Click OK.

You’ll notice that the volume and thickness didn’t change but the type name has changed. This name (data) is tied to every schedule and tag in the model. What that means is that if the architect or structural engineer clicked Print, then every location where this basement floor is called out on the drawings would say 12” Concrete Basement Floor. If you navigate back to the schedule, you’ll see what I mean. It now says 12” Concrete Basement Floor, but the price is the same as the 6” floor. That’s an almost $18,000 discrepancy.

Architects and engineers do multiple projects so they will develop robust libraries of standard Revit families in order to help their teams be more efficient and consistent from project to project. On a fast-track design schedule, these standard libraries are lifesavers, but sometimes, even with the libraries, designers use shortcuts to meet the deliverables. What can happen is that experienced and inexperienced modelers will use elements out of the library and manipulate certain properties to fulfill the design intent and neglect properties required for estimating, like the structure of an element. You can see these properties by clicking the Edit button in the Structure field shown in Figure 4.29. Notice how it says 6” under the Thickness column even though the type says 12” Concrete Basement Floor. There’s a conflict within the model information, but the design intent is met for the drawings (Figure 4.35).
Figure 4.35 Elevation view

Hopefully estimators would catch this in the manual takeoff, but they may just look at the tag (12" Concrete Basement Floor) and do a square foot calculation. This is part of the reason why Architect and Engineering firms are hesitant to release their models to contractors. First, they’re giving you their company’s library of families, and second, they don’t want to be liable for errors in information that were extracted outside the printed contract drawings.

On the August 8, 2014 “Fridays with Trimble” webinar, Vico Office product manager Duane Gleason said that on average you can extract about 65 percent of the estimate from an architect or engineer’s model. To mitigate the 35 percent risk, some companies create their own parallel model as they receive information from the architect and engineer to ensure the model is accurate for estimating. This isn’t necessarily the leanest approach, since you’re doubling the efforts of model creation, but it will help identify constructability issues and the estimate will be more reliable. Others prefer to use a hybrid approach of 2D and 3D estimating, similar to constructability review. This seems to be the most popular approach, and both Autodesk and Trimble have developed software programs for this takeoff method.

**Cost Trending with Assemble**

Cost trending during design is a different strategy than estimating precise quantities. Cost trending is more about being able to track the evolution of the design as a rough order of magnitude (ROM). Basically, you acknowledge that the model isn’t perfect and leverage it for its efficiencies, such as the ability to produce instant quantities. There are a couple ways to approach this idea:

**Sharing Your Company’s Pricing** One way is to have a collaborative team where you share your company’s unit pricing with the design team so they can create calculated values within the evolving models. This allows the entire team to see real-time gains and losses. The design team can also export the schedules as text files that can be copied into Microsoft Excel or any other database for further analysis (Figure 4.36).