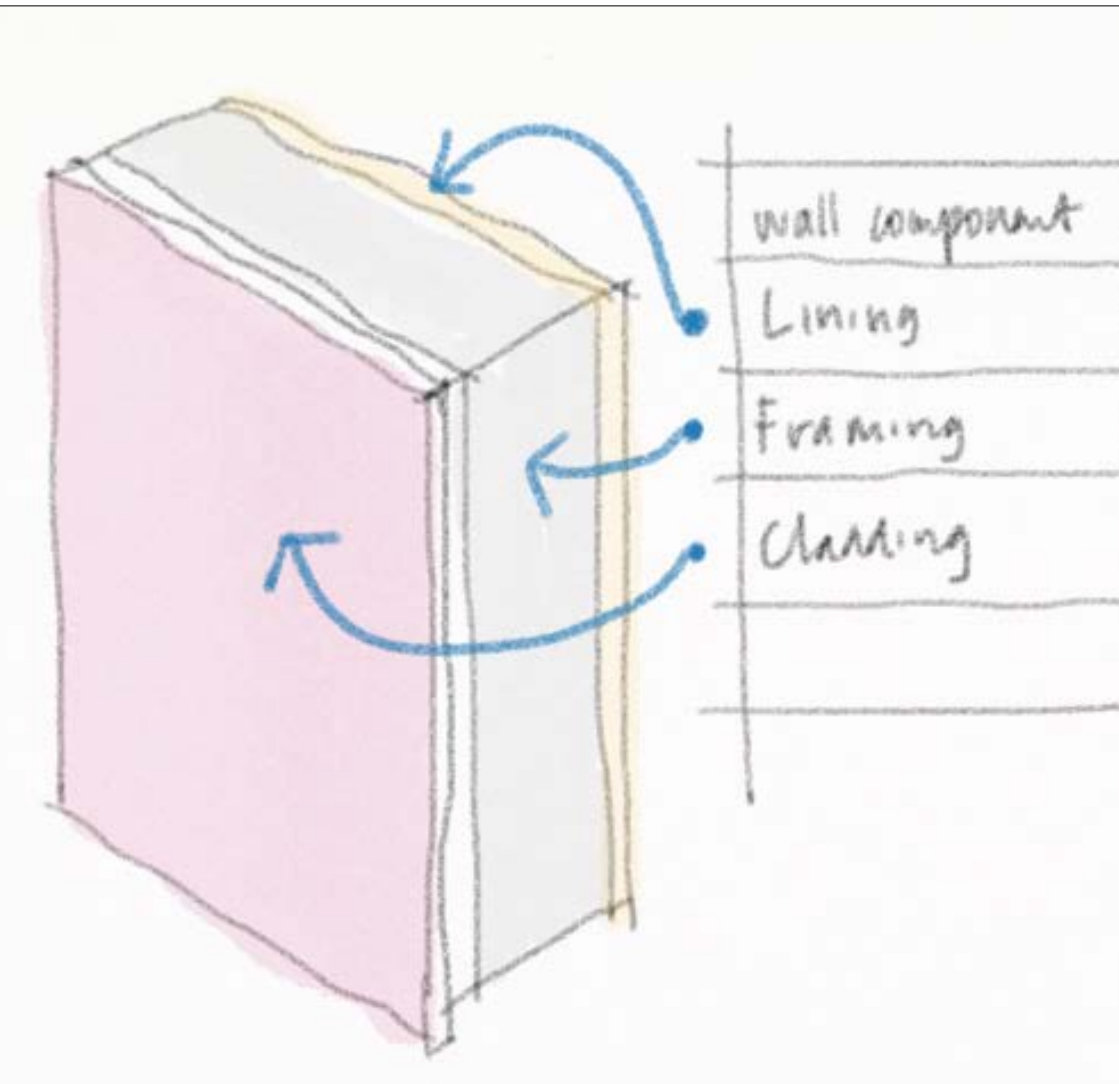
SHORT SHARP MANUALS

1602 Building Takeoffs



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Contents

Introduction

In this manual are going to cover the concept of creating a building takeoff report. In order to do that we are going to cover the basics of creating worksheets (which is the technique we need to use to create a report). We will also look at designing a building takeoff, because while Vectorworks has the ability to report all the information you require, it doesn't know yet what information that might be.

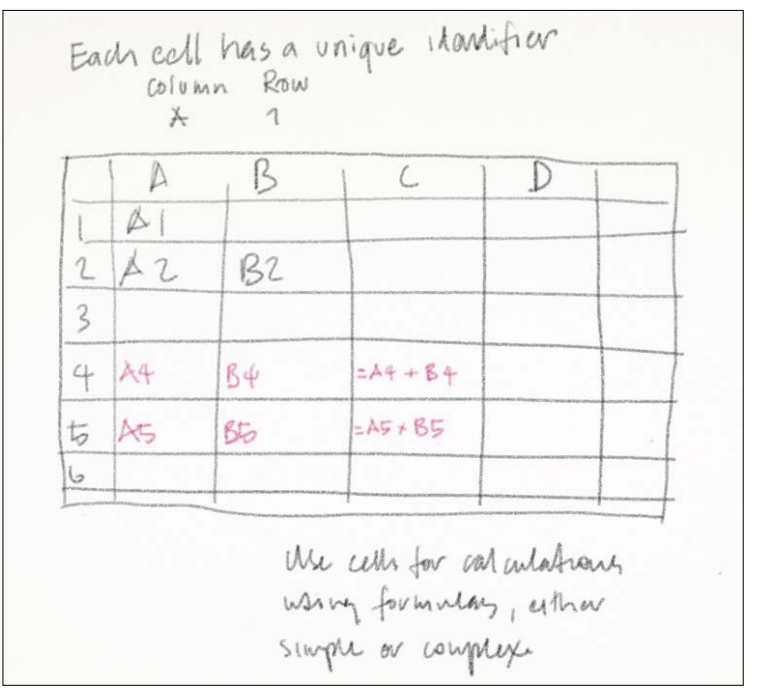
It is most important that you understand the concept of using worksheets. We have covered worksheets and other manuals, and I will not be repeating some of that information, but I will be covering enough for you to understand how a worksheet is designed to be used.

Introduction to Worksheets

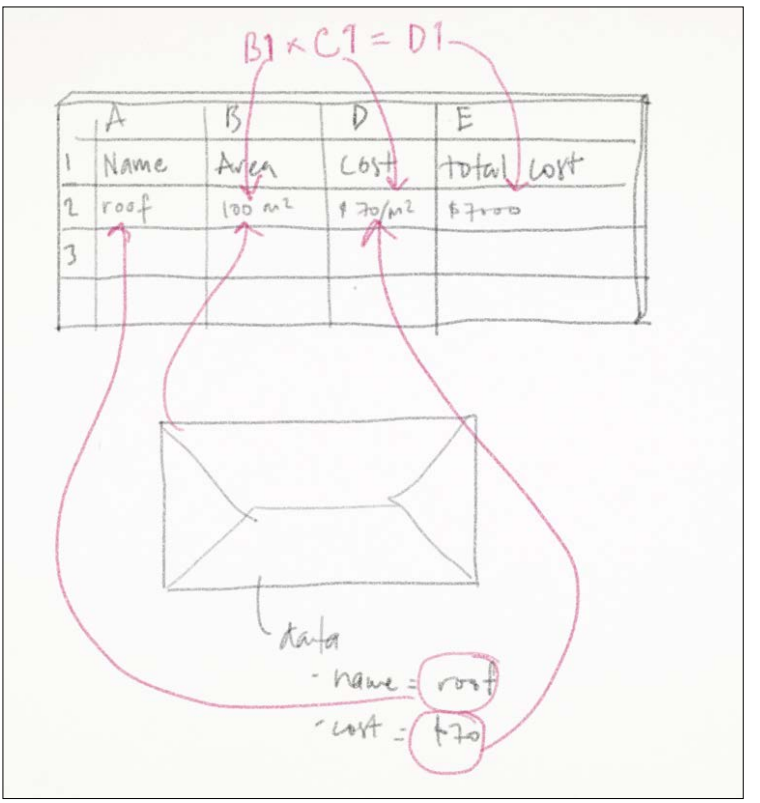
a worksheet in Vectorworks is very similar to an Excel spreadsheet. Vectorworks has had these worksheets for several years (for as long as I can remember using Vectorworks). They are very powerful, and they can be used to create reports of objects in the drawings, and they can be used to do calculations.

The basic strategy of a worksheet is that each cell has a unique identifier which is the column number then the row number. For example, the first cell in the worksheet (at the top left corner) is cell A1, because this is column A and row 1. the next cell across would be in column B, but still in row 1, so this is cell B1. The cell directly below a one is cell A2, and so on.

If you want to use cells for calculations you can tell Vectorworks to add one cell to another, multiply one cell by another, subtract divide et cetera.



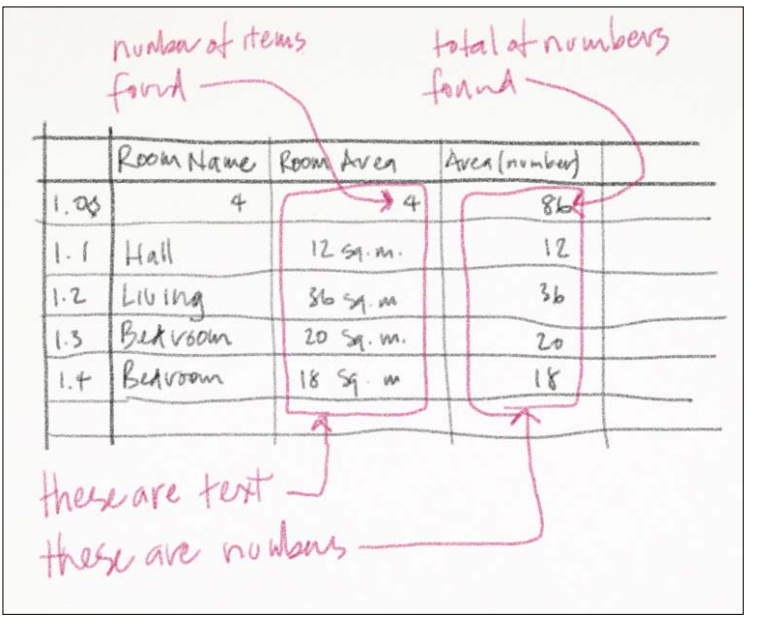
In the case of the building, we might use the worksheet to look for parts of the building, such as the roof. Vectorworks has a search criteria that would allow us to find the area of the roof. We could then input the cost of the material for this roof and instruct Vectorworks to calculate the area times the cost. When the design changes, we would only need to tell Vectorworks to update our worksheet, and Vectorworks would find the new roof area and multiply it by the cost of the material, to bring you a new total cost.



When you report information from your objects in Vectorworks,the information may be reported as numbers, or as text. The differences are because Vectorworks has different types of information that can be attached to objects. Some of this information is text based, and some is number based. The difference will not be apparent until you start use the information for calculations. It is easy to use mathematical formulas on numbers, but it is not possible to use these on text based information.

For example, a common problem might be reporting areas of spaces. The space object has the area as text, and it also has the areas as numbers. In the image below I have sketched out the difference between the text and numbers. The text actually looks like a number because it has the area units with the number. The number information just displays the area as a number. However, the text information cannot be added and so when you're trying to create an overall report of the area of the spaces, your calculations will fail.

The other column (with the numbers on their own) is the same information but reported as numbers only. Notice how at the head of the column you can see the total (the sum of all the spaces).



There are two main techniques for getting information into your worksheet.

1. Criteria - in this technique you would ask me to ask for look for specific objects based on some sort of criteria, such as the class, layer, etc. this method is ideal for finding objects that do not have data attached to them. An example of this would be creating a report that will give you the site area, the building area, impermeable surface area, and it will perform calculations on these areas.

2. Database - with this technique you ask Vectorworks to look for objects that have a database attached. This technique allows you to report the data. An example of this technique would be creating a report of all the windows in the project. This report could give you the window number, the window height, width, sash operation, etc.

Designing Your Report

It is very important to decide what you want to report. There is an almost unlimited choice about what to report, so you have to think carefully about what is most important.

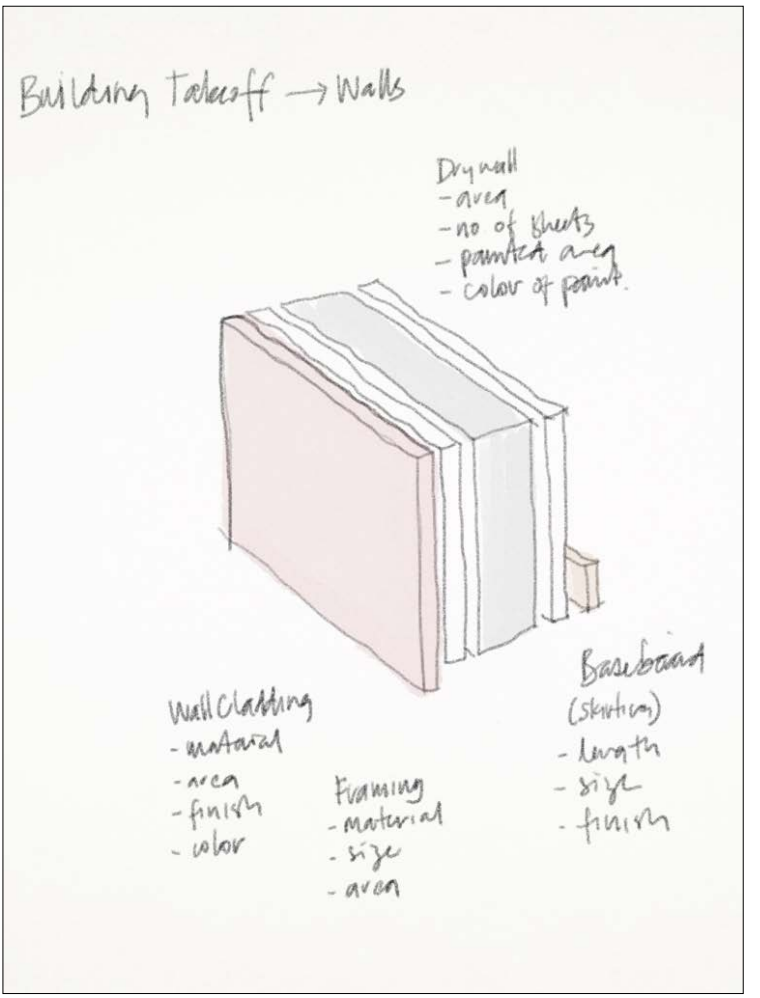
You will find it easier to create your report if you design it first. Sometimes the choices you make about the reporting will have an effect on the tools you use, or the options you set for the tools.

For example, if you look at walls, you might want to report the basic area of the wall, as you might do for a foundation wall. In this case there is no need to create a wall style that has components.

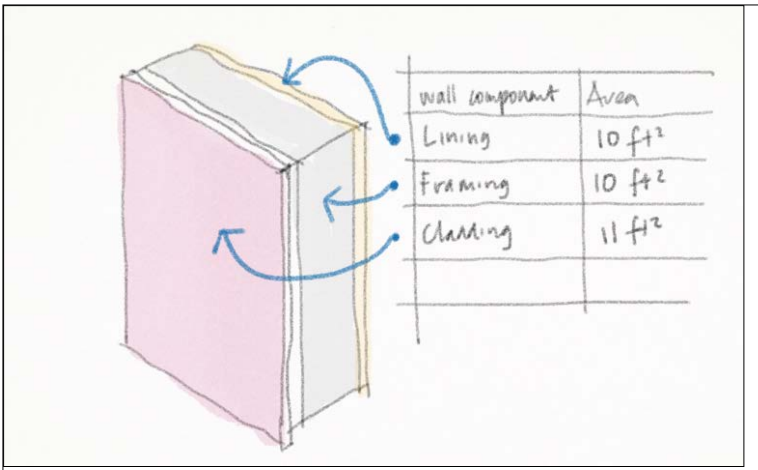
You can see from this sketch that there might be a lot of information required from each component. Some of this information can be reported directly from the wall components, the other parts might be in the description of the wall style, while other information might have to be added to the wall using Record Formats.

You can see how important it is to think about all this before you start you

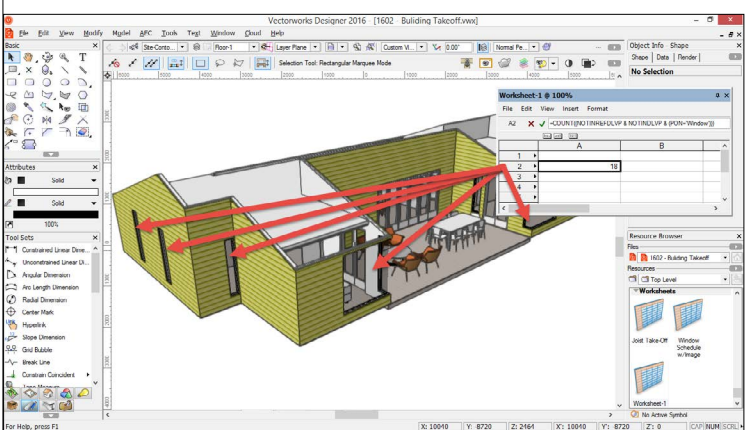
report, but it is also important the think about all of this before you start your projects.



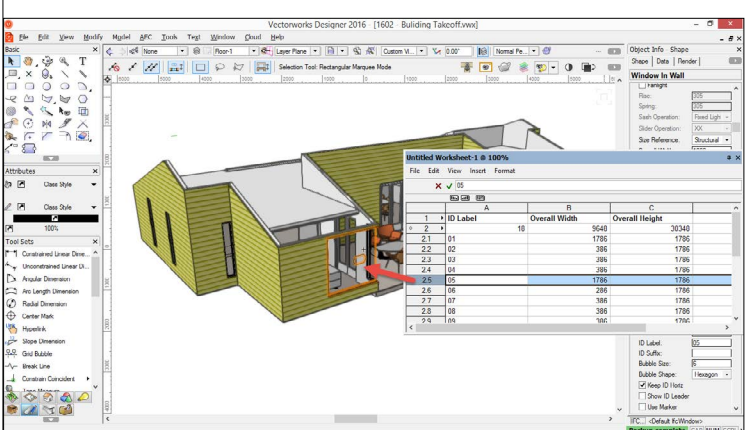
If you wanted to create a report that calculated the area of the cladding, the cladding material, the thickness of the cladding, the colour, and you wanted to report similar information about other parts of the wall, then you would need to create wall components. The easiest way to create the walls with the components is to use a wall style.



Some objects have data attached to them (walls, windows, doors, etc) and you can create a report that just counts the number of windows. That might be enough for your report, as shown in the image below.

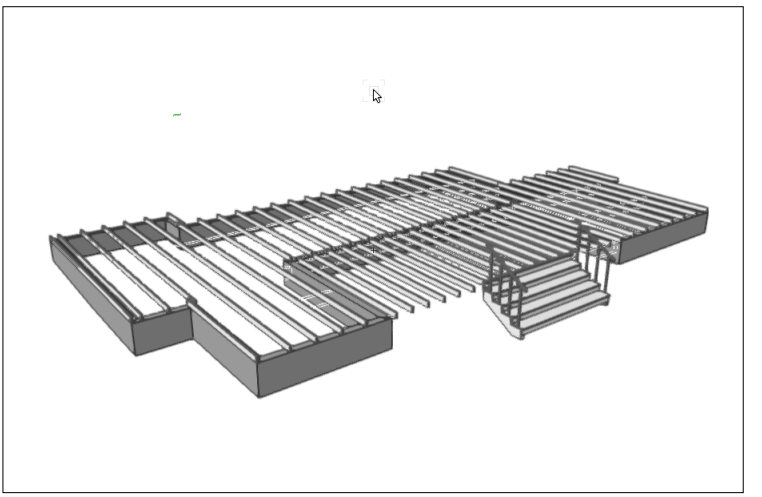


However, you might require more information about your windows. In the image below, you can see the report has a lot more information about each window. This report uses a different technique from the report above to report the information that is attached to each window. This technique is called a database report.



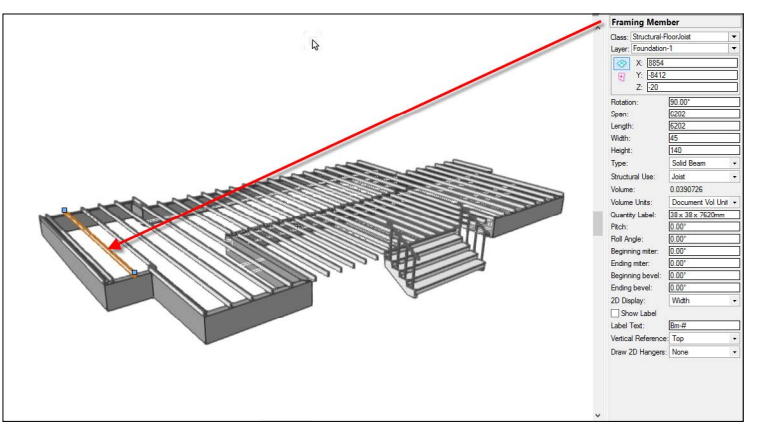
Foundations Part 1

Before we create the report, we need to have a look at our options. We have the foundations drawn with foundation walls, floor piles, bearers, and joists.

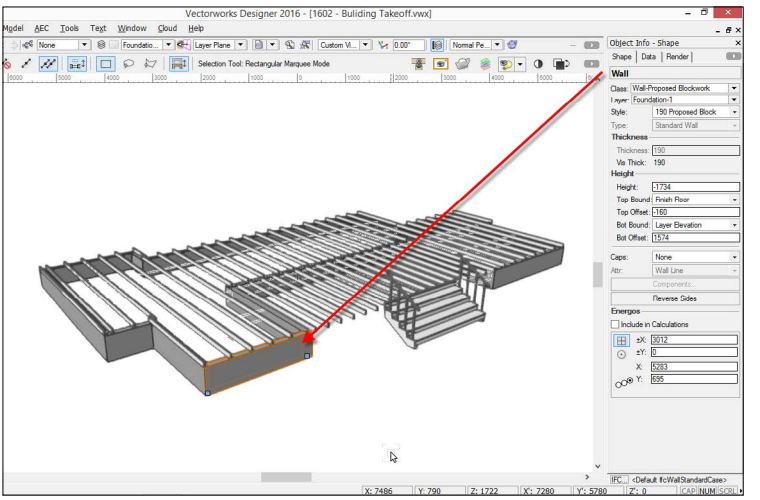


The floor structure has been created with Framing Members. These objects use the Object Info palette to control their options and they have a lot of information that can be reported in a database report.

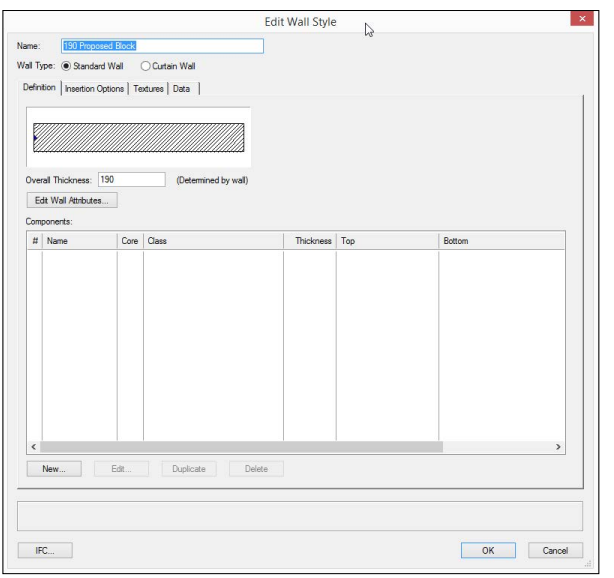
You will have to go back to your report design to see what information you need to report. You may not want all the available information, but we can sort that out later.



When you look at the walls, they also show a lot of information on the Object Info palette, and wall styles have a lot of information stored in them, but the way you report the wall information is not the same as the Framing Member.

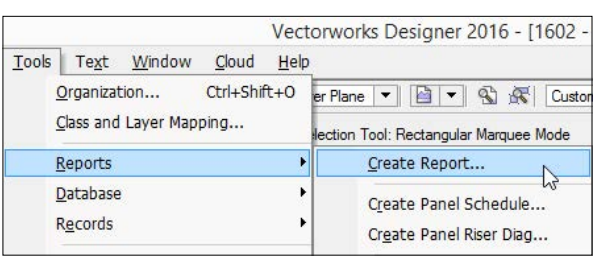


This particular wall style does not have any components, as you can see from the Edit Wall Style dialog box.



Database reports can be created using a menu command:

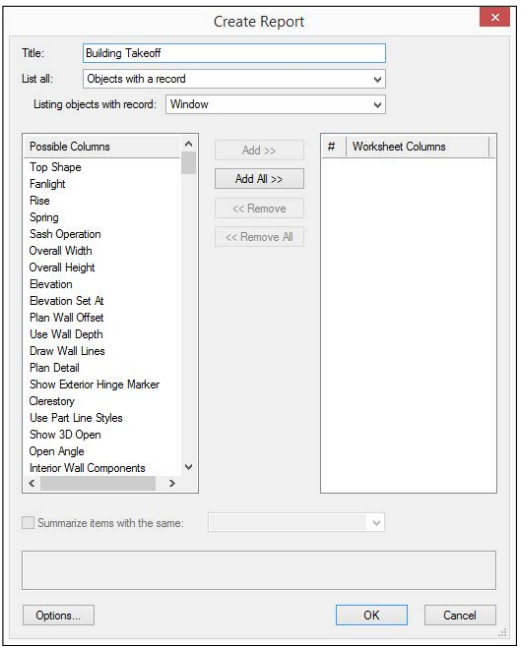
Tools > Reports > Create Report...



The database report would be ideal for the Framing Member, doors, or windows, because it will report all the information that is on the window.

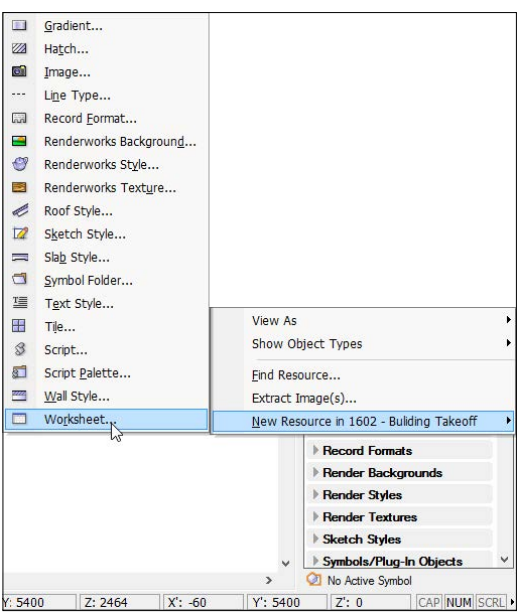
In this image you can see all the available information that you can report.

There are several choices, and unless you have designed the report ahead of time, you can waste a lot of time deciding what is required.



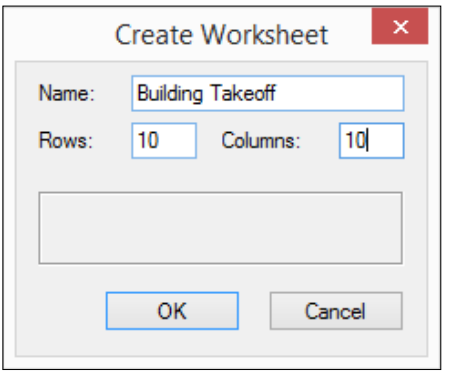
This type of report will not work with walls. Instead we have to create a report using a more manual method.

- Go to the **Resource Browse**r.
- Click on the option to create **New Resource in...**
- Choose **Worksheet...**



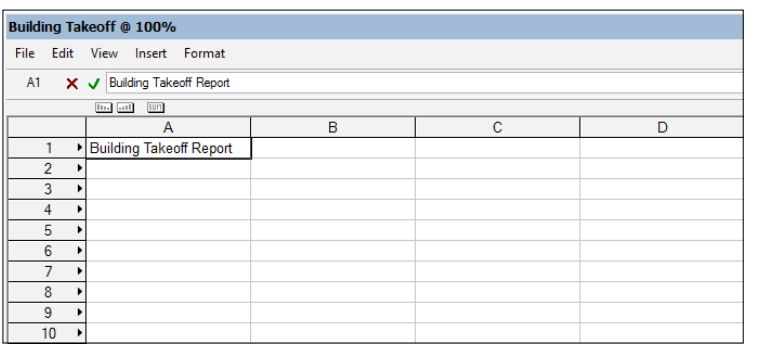
- Enter a name for the worksheet. Use a name that will make sense later on.

- You may not know the exact number of rows and columns that you need, so you can guess. If you need more rows or columns, you can add them or remove any extras that you do not need later.
- Click on the **OK** button.

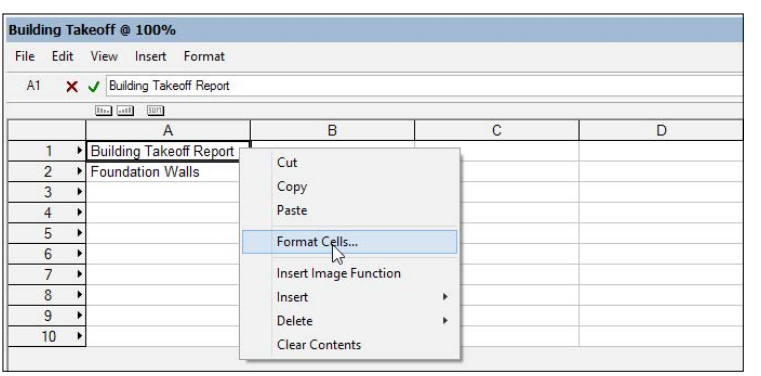


The worksheet will open in a new window.

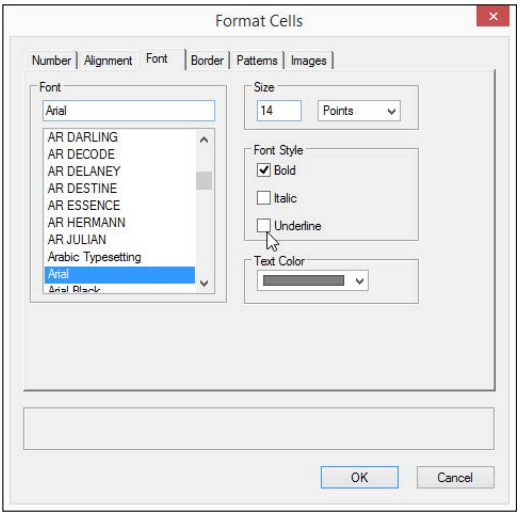
- In the first cell (cell **A1**), type in a title for the report.



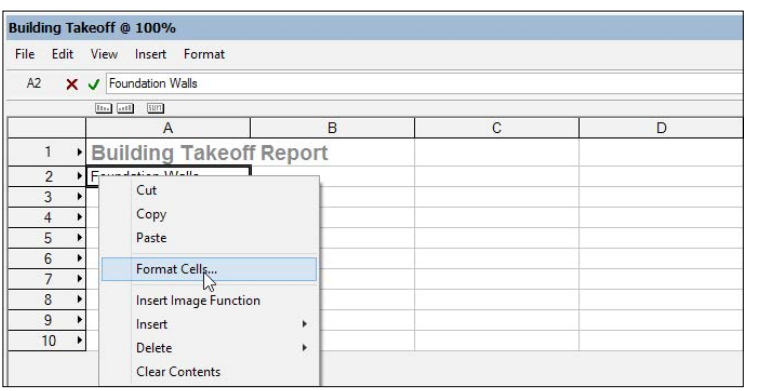
- In cell **A2** type in the title for the report on the foundation walls.
- Right click on cell **A1**.
- Choose **Format Cells...**



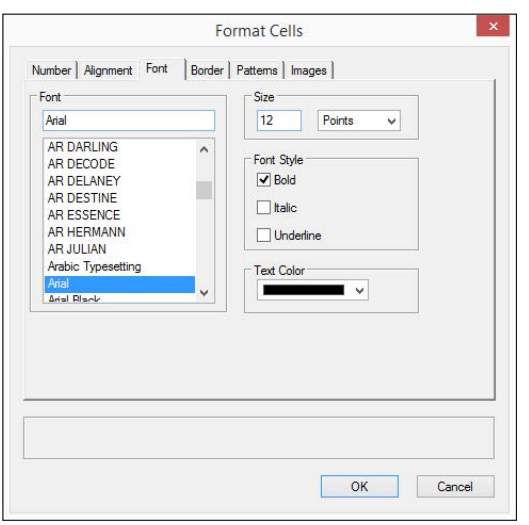
- Click on the **Font** tab.
- Choose the font, size, style, and other settings for the title.



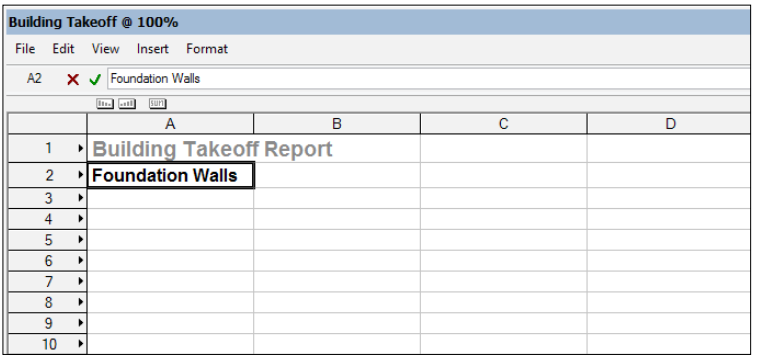
- Click on the **OK** button.
- Right click on cell **A2**.
- Choose **Format Cells...**



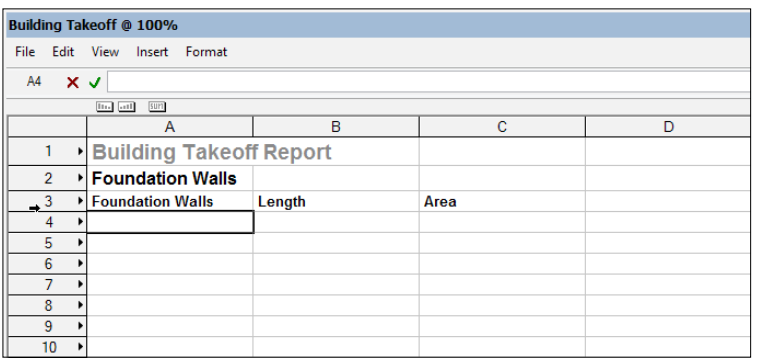
- Click on the **Font** tab.
- Choose the font, size, style, and other settings.



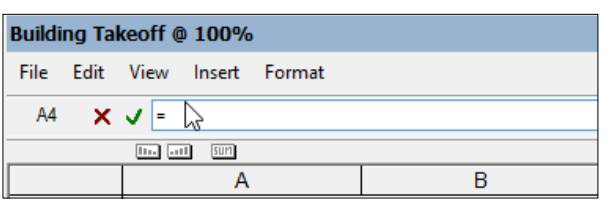
- Click on the **OK** button.



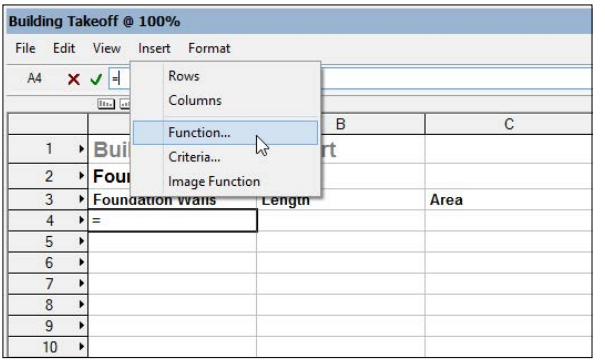
- Click in cell **A3**.
- Add titles for the portions of the foundation walls that you wish to report. In this image you can see that I require each foundation wall, its length, and its area.



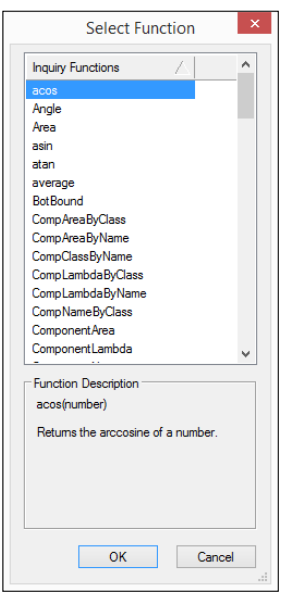
- Click in cell **A4**.
- Now we can start to put in the formulas to report the information about the foundation walls.
- Before you do anything else, make sure you put in an = in the formula bar (the area the top next to the red X and the green tick). If you forget to put this equals sign in, Vectorworks will not treat the rest of your work as a formula.



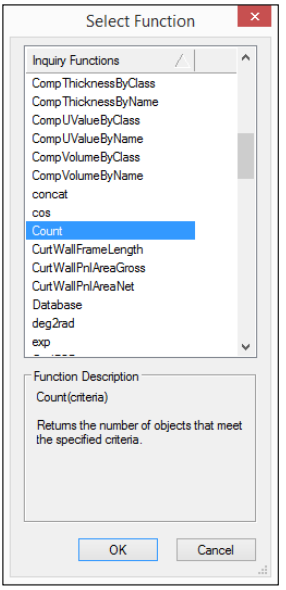
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Function…**



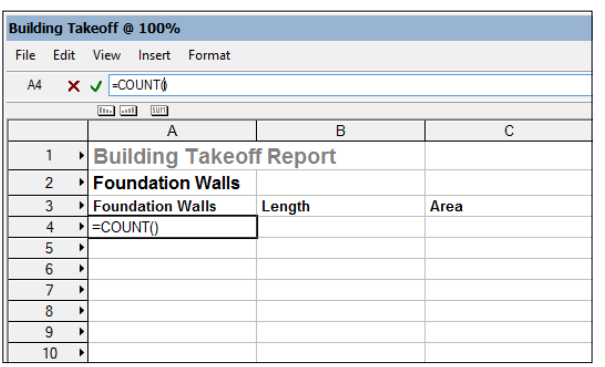
- This opens a dialog box you can select from any of the inbuilt worksheet functions. There are several worksheet functions.
- if you scroll down this list, you will see that there is a large number of available functions.
- We will not be covering all of these functions, but it is a good idea to have a look through them.
- If you click on a function the help area at the bottom of this dialog box will give you more information about its use. This is a good way to find out what that function is used for.



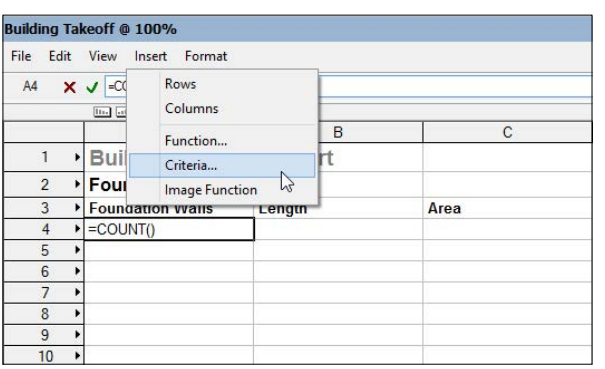
- Scroll down to locate the **Count** function.
- Click once on this function.
- Click on the **OK** button to close this dialog box and return to the worksheet.



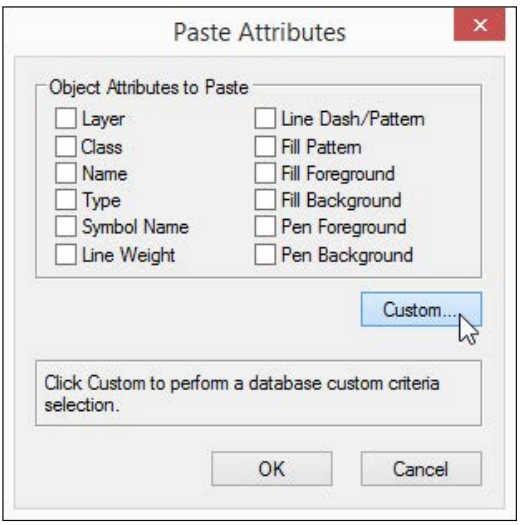
- The function is in place that Vectorworks doesn't know what this function is related to. In other words,Vectorworks needs to know what objects we are trying to count. This concept is called the criteria and it works like a filter, to choose just the things that we want



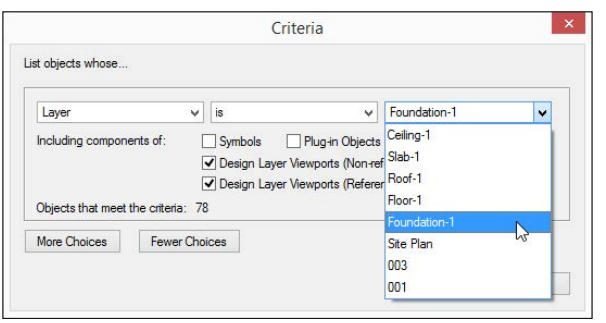
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Criteria…**



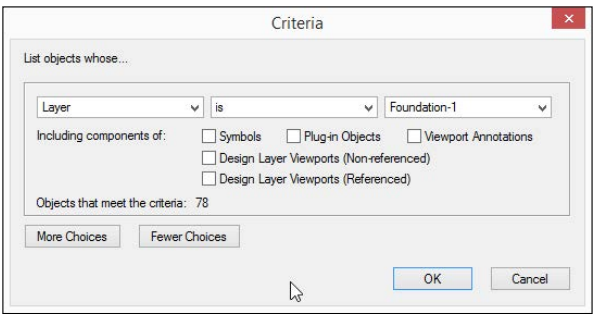
- If you have an object selected, you will see this dialog box.
- Click on the **Custom…** button.



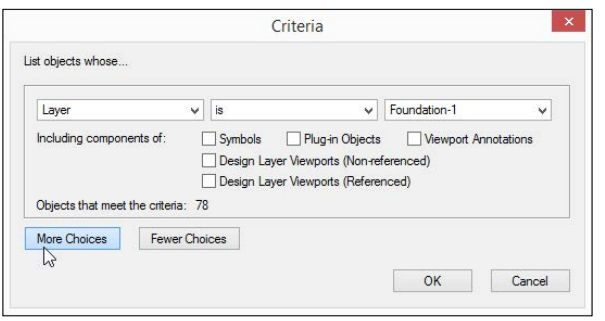
- If you do not have any object selected you will be taken straight to the Criteria dialog box.
- Remember that the criteria is like a filter and this is where we set the filter options.
- In the first instance we want to limit the counting to objects in the **Foundation** layer.
- On the left pop-up menu choose **Layer**.
- On the right-hand pop-up menu choose the **Foundation** layer



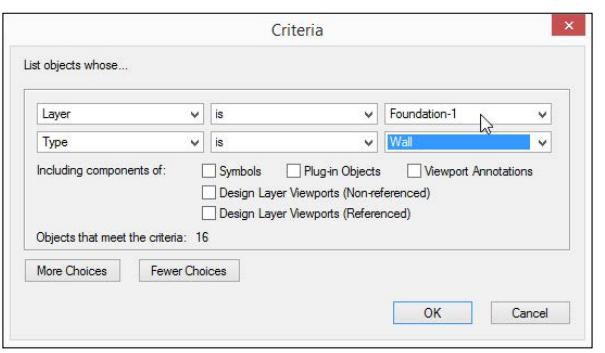
- Turn off the options to look for objects in Design Layer Viewports (un-tick those options).
- When you make changes in this dialog box, Vectorworks will show you how many objects meet that criteria. At the moment there are 78 objects that meet the criteria of being in the foundation layer.



- At the moment we are looking for any object on the foundation layer and we need to add additional filters (where it says more choices).
- Click on the More Choices button.

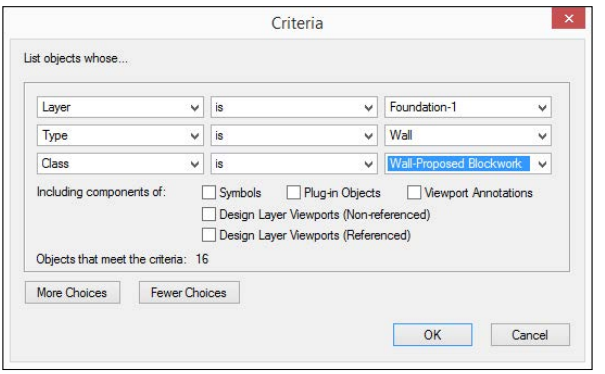


- On the left pop-up menu choose **Type**.
- On the right-hand pop-up menu choose **Wall.**
- When we add the filter for wall, there are now only 16 objects that meet this criteria.

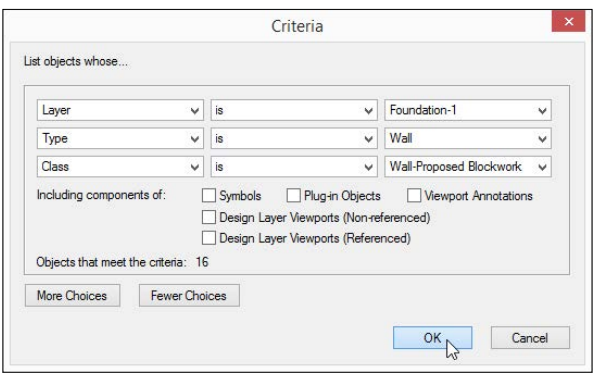


- you could add additional criteria to make sure that you are just getting the foundation walls.
- For example, you could add another choice, choose **Class** in the left pop-up menu and choose the **Wall-Proposed Blockwork** class in the right-hand pop-up menu.
- You might notice that there are still 16 objects selected. You might be wondering why I go to the trouble of adding the class as well as adding the wall. The answer is I might in the future decide to add more walls that are not related to the foundations, I do not want these showing up in

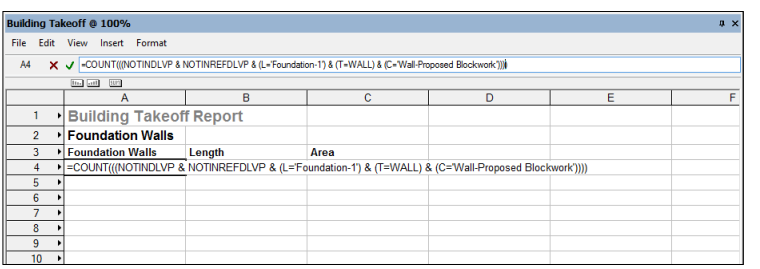
my report as foundation walls.



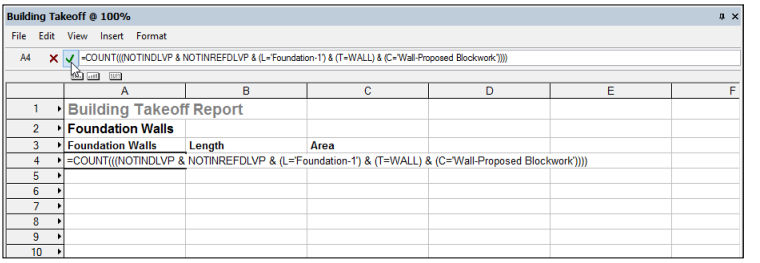
- When you have added all the required criteria, click on the **OK** button.



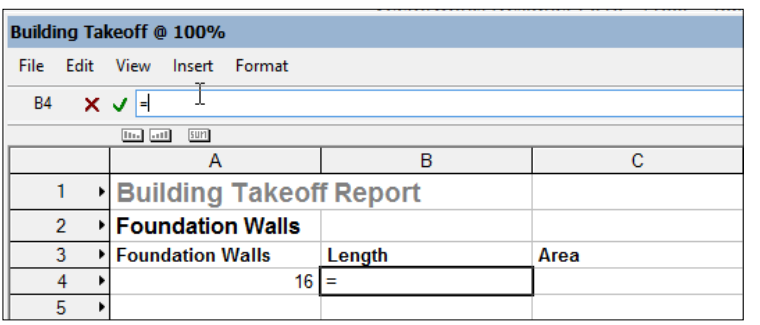
- The criteria has been added to the worksheet. You can see it in the formula bar.



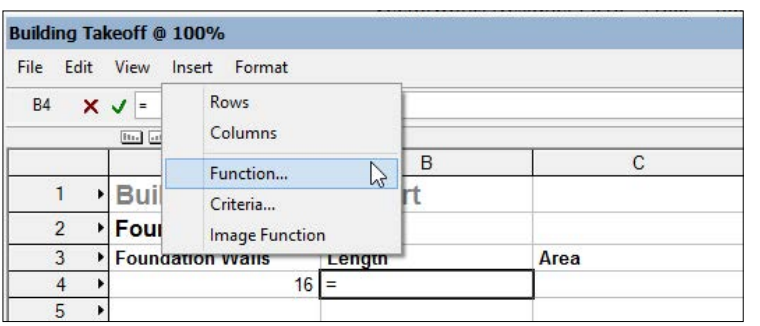
- This is not giving the required information yet.
- Click on the **green tic**k next to the formula bar. This will tell Vectorworks that you are satisfied with the information you have entered and you want Vectorworks to use this formula.
- If you make a mistake, you can click on the red X next to the formula bar and Vectorworks will undo the information you have entered.



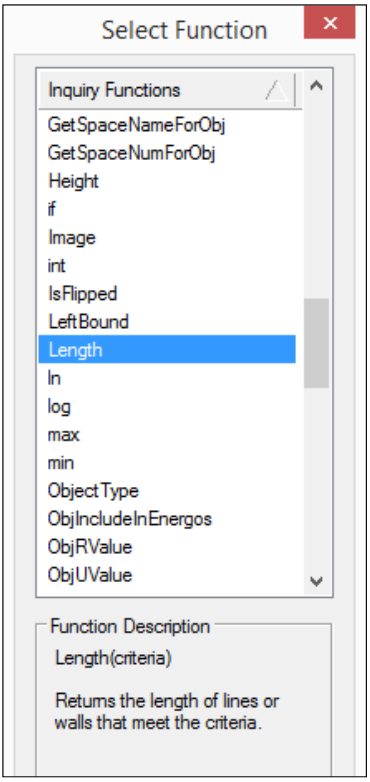
- The report currently shows that we have 16 walls that meet our criteria, but we also need to find the length and area of those walls.
- Click on cell B4.
- Type in an =.



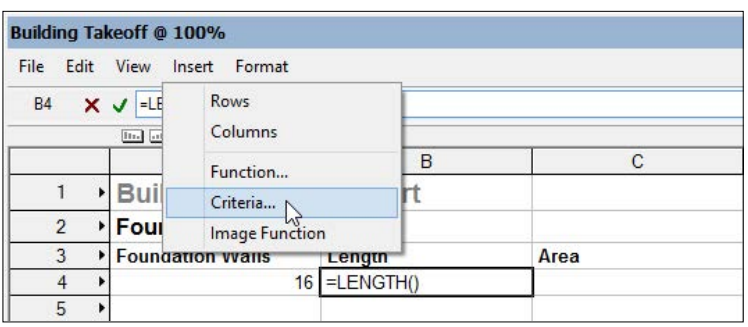
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Function…**



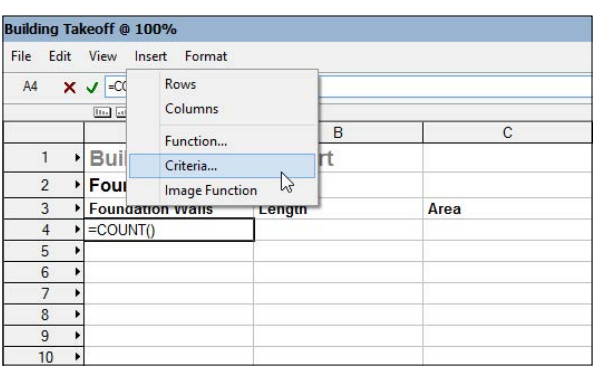
- This opens the function dialog box.
- Scroll down until you find the **Length** function. The description will tell you that this function will give you the length of lines or walls that meet the criteria. notice that it will only report the lengths of lines or walls. If we were looking for the length of a polygon or polyline, this function would not be suitable.



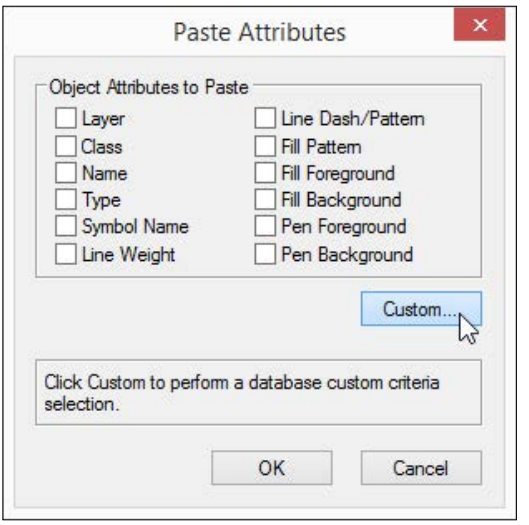
- Click on the **OK** button to return to the worksheet,
-



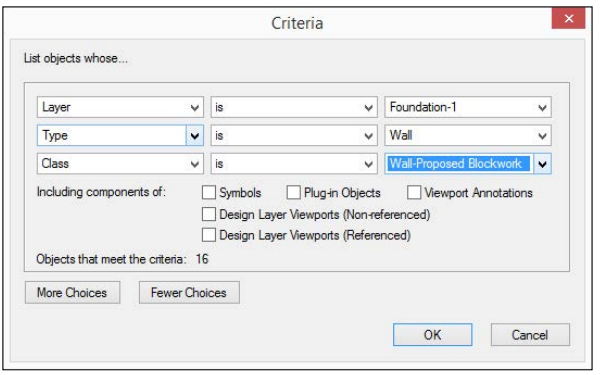
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Criteria…**



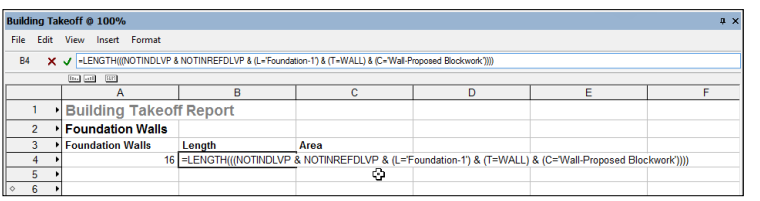
- If you have an object selected, you will see this dialog box.
- Click on the **Custom…** button.



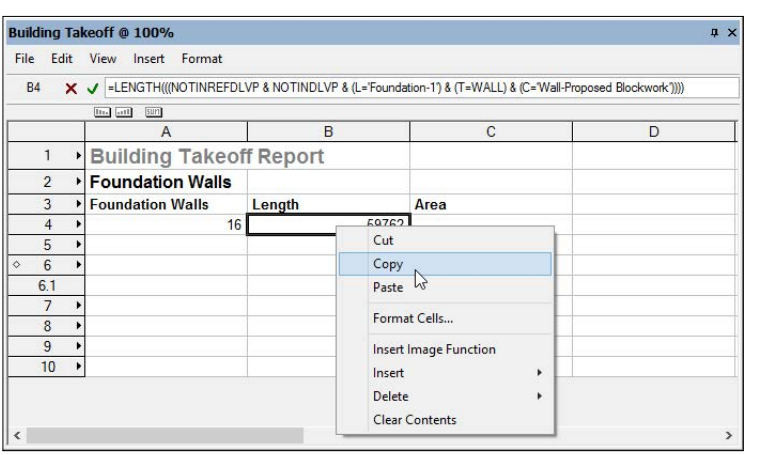
- If you do not have any object selected you will be taken straight to the Criteria dialog box.
- Remember that the criteria is like a filter and this is where we set the filter options.
- In the first instance we want to limit the counting to objects in the **Foundation** layer.
- On the left pop-up menu choose **Layer**.
- On the right-hand pop-up menu choose the **Foundation** layer
- Turn off the options to look for objects in Design Layer Viewports (un-tick those options).
- Click on the **More Choices** button.
- On the left pop-up menu choose **Type**.
- On the right-hand pop-up menu choose **Wall.**
- Click on the **More Choices** button.
- On the left pop-up menu choose **Class**.
- On the right-hand pop-up menu choose **Wall-Proposed Blockwork.**



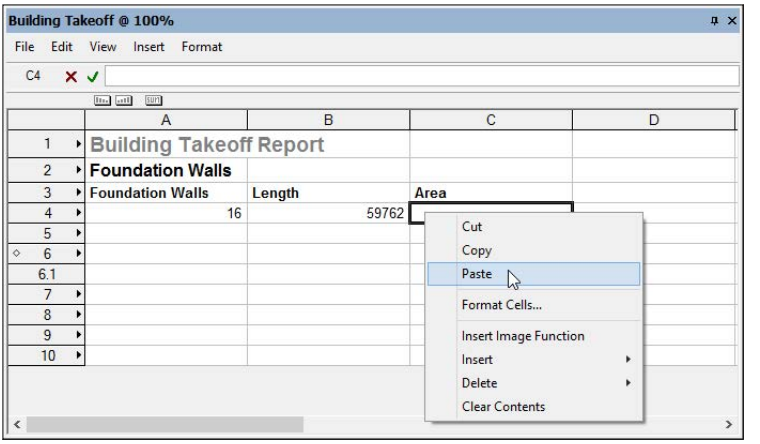
- When you have added all the required criteria, click on the **OK** button
- The criteria has been added to the worksheet. You can see it in the formula bar.



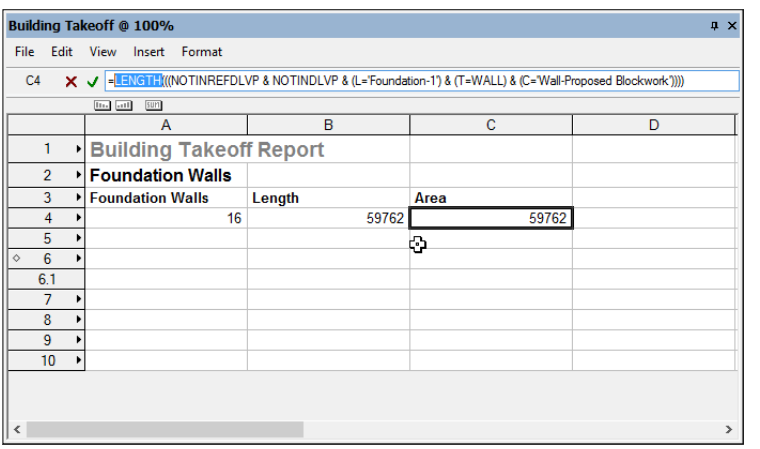
- This is not giving the required information yet.
- Click on the **green tic**k next to the formula bar. This will tell Vectorworks that you are satisfied with the information you have entered and you want Vectorworks to use this formula.
- If you make a mistake, you can click on the red X next to the formula bar and Vectorworks will undo the information you have entered.
- We now have the current lengths of all the walls, and that area calculation will be very similar to the calculation and the criteria that we have used for the lengths.
- Right click on the length calculation cell and choose **Copy**.



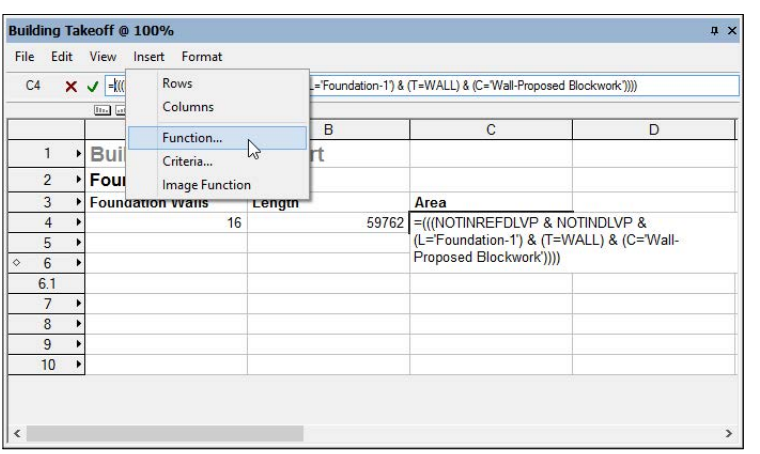
- Right click on the cell for the area calculation and choose **Paste**.



- We need to edit the function for the cell.
- Go to the formula bar and delete the word **Length**.

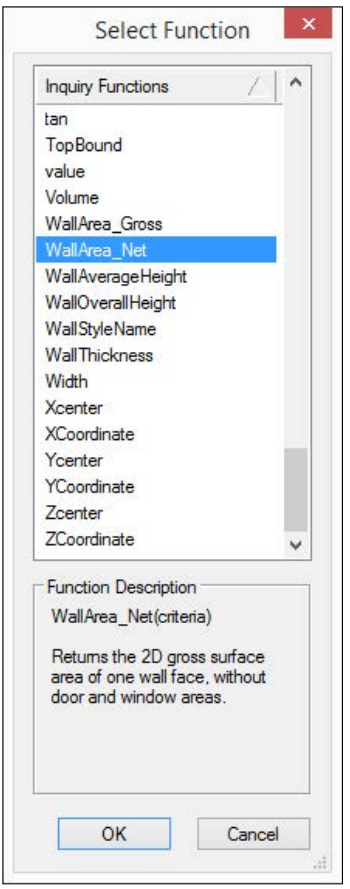


- On the worksheet window go to the **Menu** bar.
- Choose **Insert > Function…**

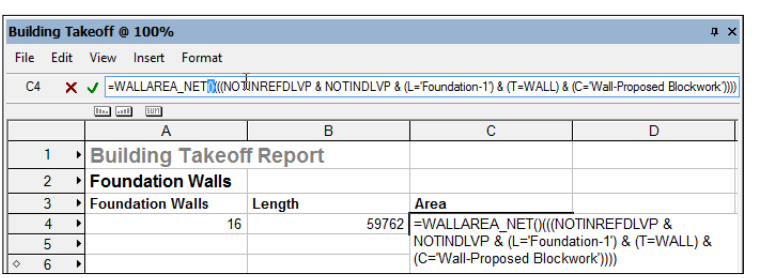


- It is tempting to use the function Area, but this function will not find the area of a wall. You will notice this if you click on the area function and read the description.

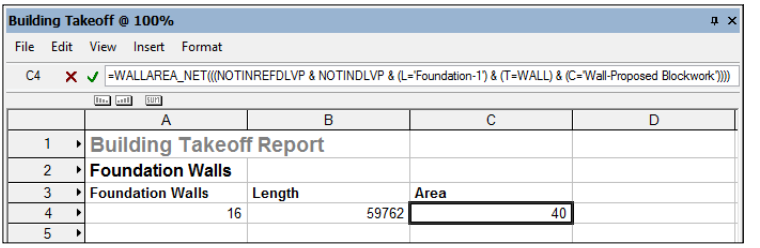
- Scroll down until you find the function **WallArea_Net.** You will notice that there are several walls specific functions. The wall area net function will report the area of the wall less any holes (windows or openings). If you use the wall area gross function, it will ignore any holes in your wall and report the overall area of the wall.



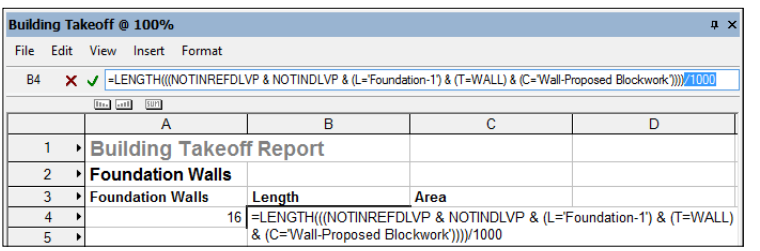
- Click on the **OK** button to return to the worksheet.
- When you insert a function it also inserts brackets behind the function. These additional brackets are not required and will cause an error if left.
- Delete the extra brackets that are not required.



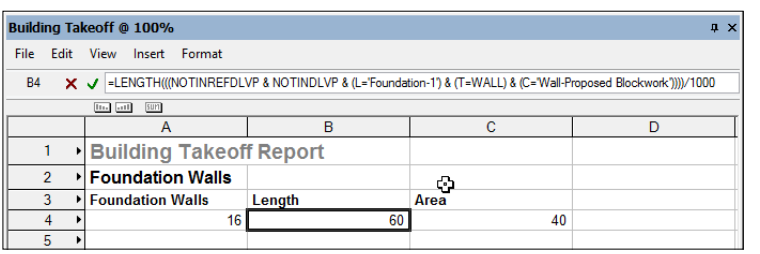
- Click on the green tick to update the calculation



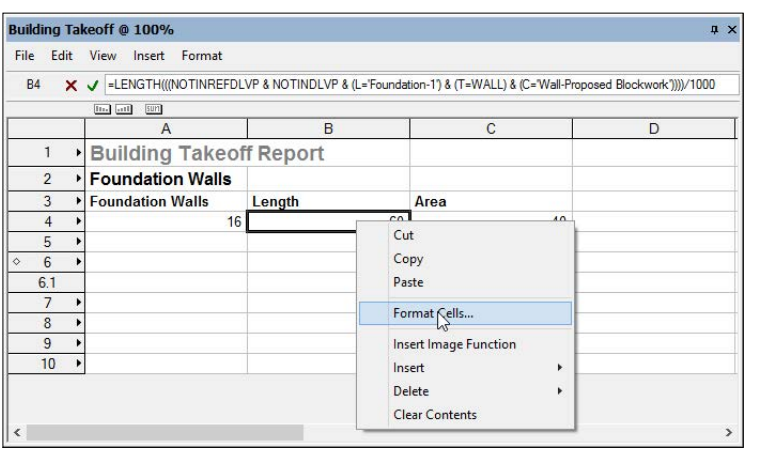
- This gives us the information, but it is in a raw form. My current units for dimensions is millimeters, but I want the worksheet to report in different units. In this case, I really need the lengths in meters.
- In this case, I need to divide the result by 1000 to give meters.



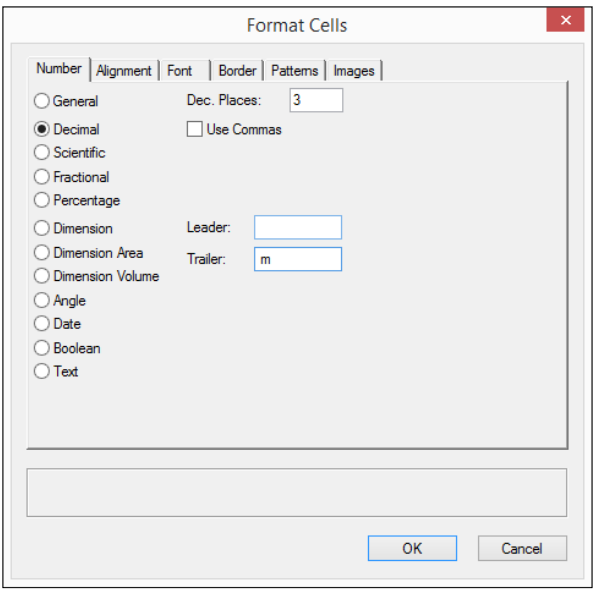
- After entering the formula, click on the green tick.



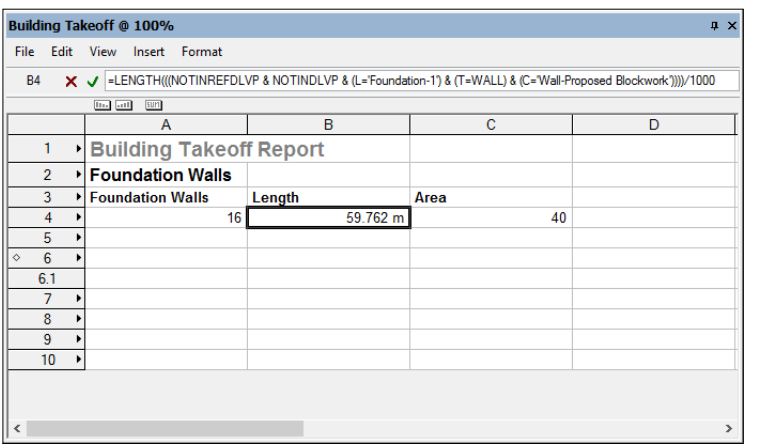
- To format the cell, right click on the cell and choose **Format Cells...**



- Change the format to a **Decimal** with **3** decimal places (**Dec. Places**)



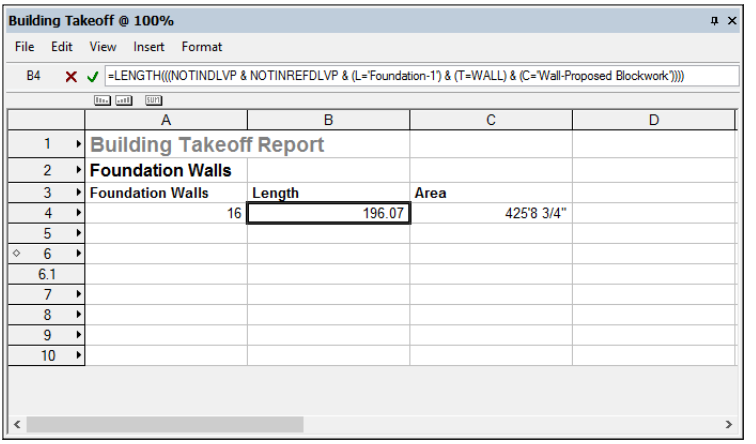
- Click on the **OK** button to return to the worksheet
- Notice the length is now shown with the unit mark.



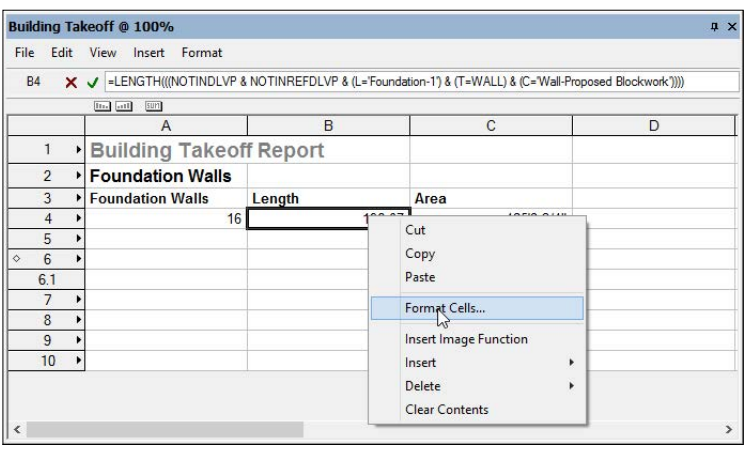
The reason that I had to add the unit mark manually is because my units are set to use millimetres, but in this case it makes more sense to show the length as metres.

If I was using metres as my units in the file, I would not have to manually add the unit mark, I could use the dimension settings for this.

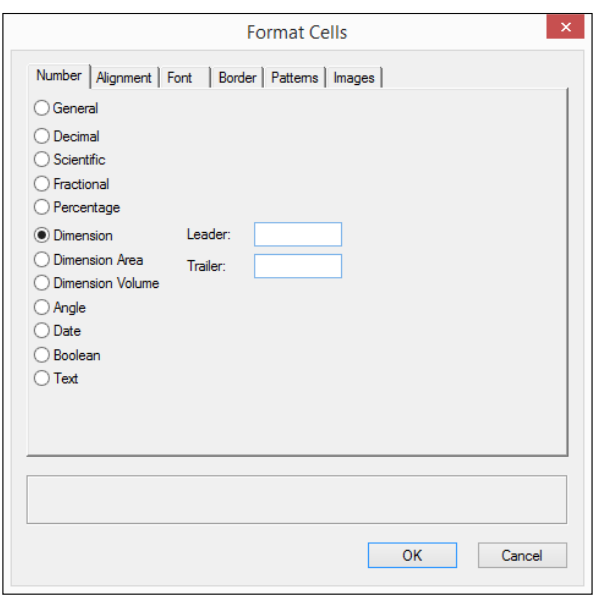
For example, if you are using imperial measurements, you might have set your units to be feet and inches. In this case you would probably have the unit mark shown, otherwise it's confusing what the numbers relate to.



- Right click on the cell and choose **Format Cells…**

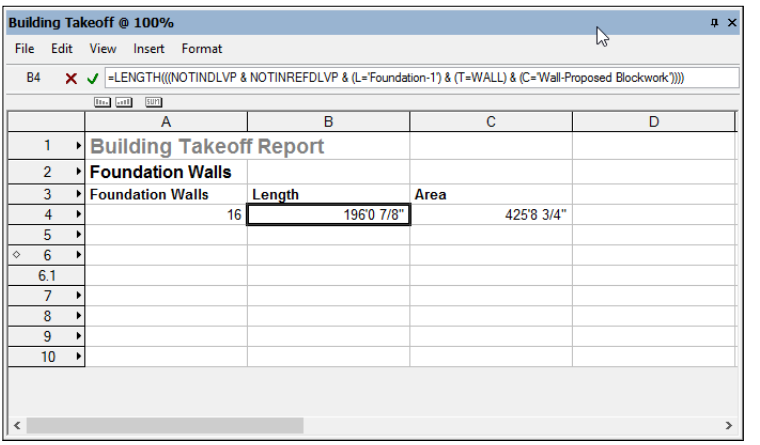


- This time we can choose the **Dimension** format.

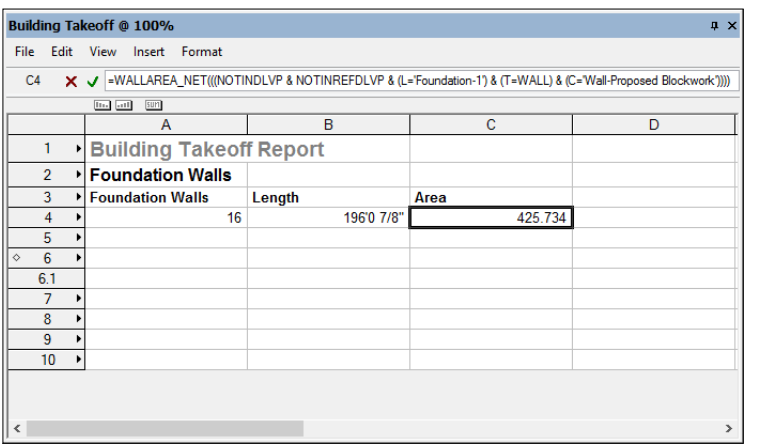


- Click on the **OK** button to return to the worksheet.
- Now you can see the total length of your wall with dimension settings

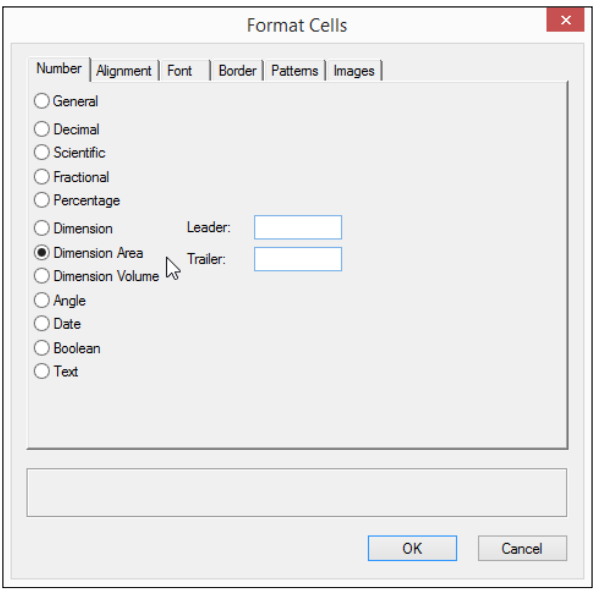
that make sense.



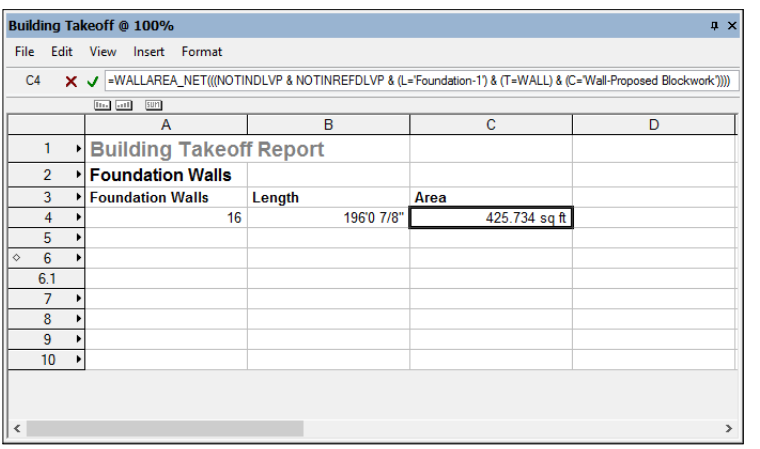
- Go to the area calculation cell.
- Right click on the cell and choose **Format Cells…**



- If you have set the area dimension units, you can choose the option Dimension Area, and Vectorworks will add the correct units to the end of your dimensions.



- Click on the **OK** button to return to your worksheet.



The report shows the 16 walls, the total length of the walls, and the total area of them. But it doesn't break down the walls into individual quantities, it doesn't allow us to see the individual length of individual walls.

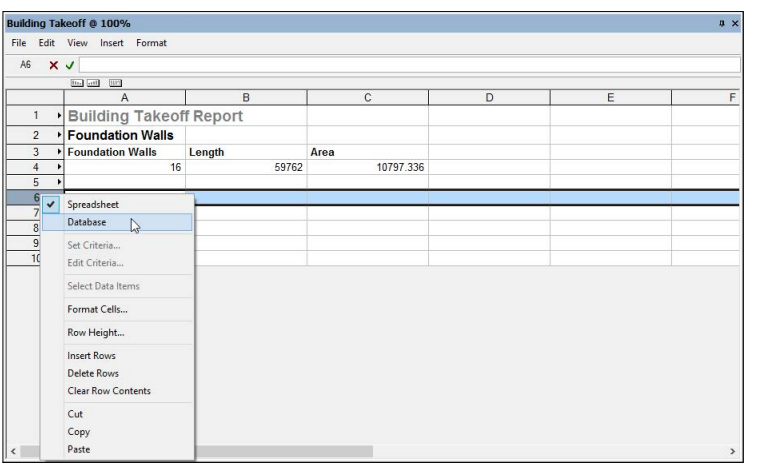
The previous report came as the total lengths and the total areas of all the foundation walls, but this is not useful if we have different wall styles that make up our foundation walls. In the report above if we have different wall foundation types, they will be counted together.

We need to have a report that will give us all the same wall types together, but we don't want to create a report the looks for individual classes for each wall type. It would be better if we could use the wall style itself collect all of our walls together.

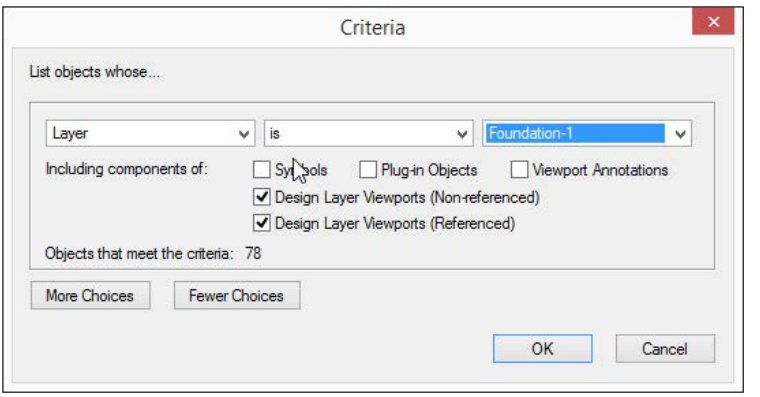
There is a technique that we can use for other parts of the building that will automatically create a database looking for objects based on the information attached to them. We can't use this for walls, so we need a different approach.

In this part of the manual we look at how to create a database report manually.

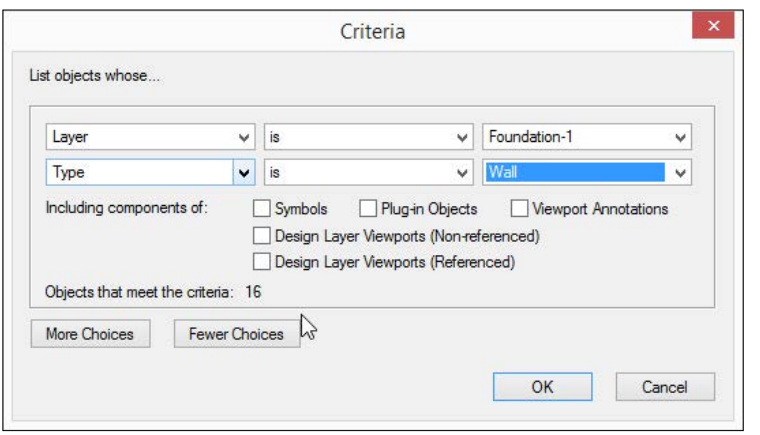
- Right click on row 6.
- Choose **Database**. This technique will allow us to count individual objects and report individual lengths and areas of those objects.



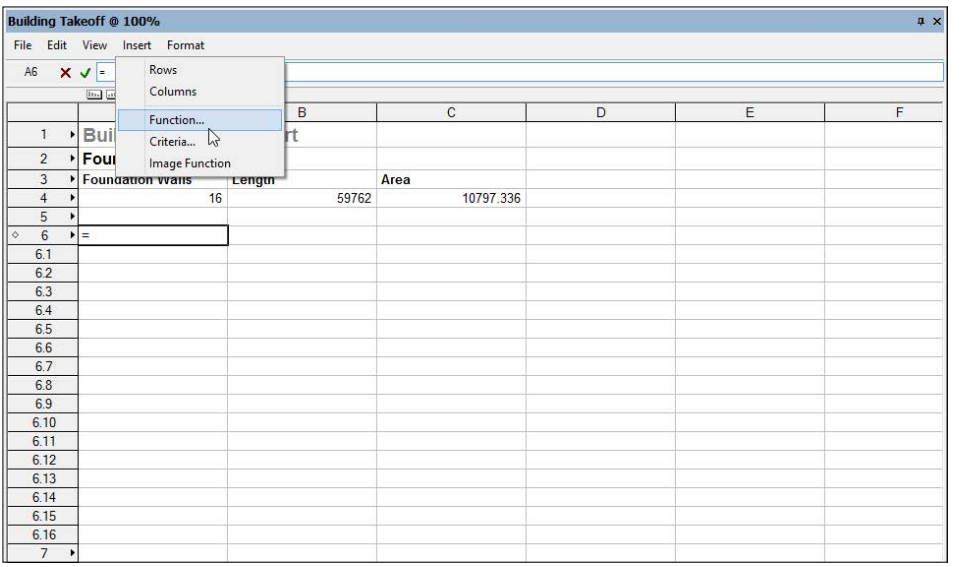
- As soon as you click on the database option, Vectorworks will open the criteria dialog box.



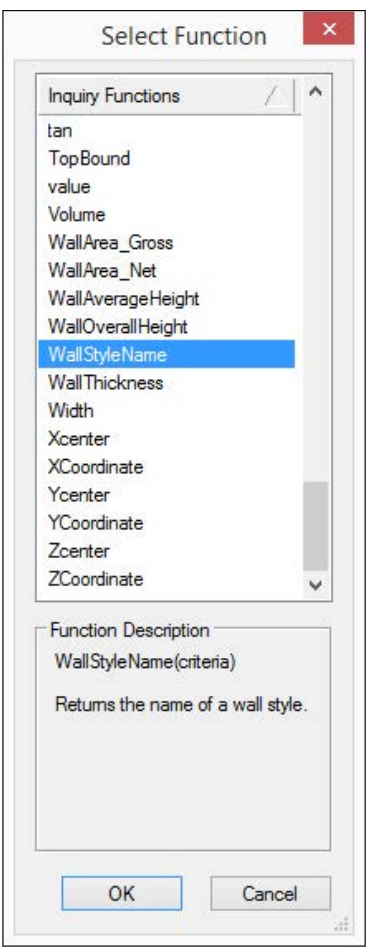
- This is the same criteria dialog box that we have previously used, so we can set this to look for walls on the foundation layer.
- When you have entered the required options, click on the **OK** button.



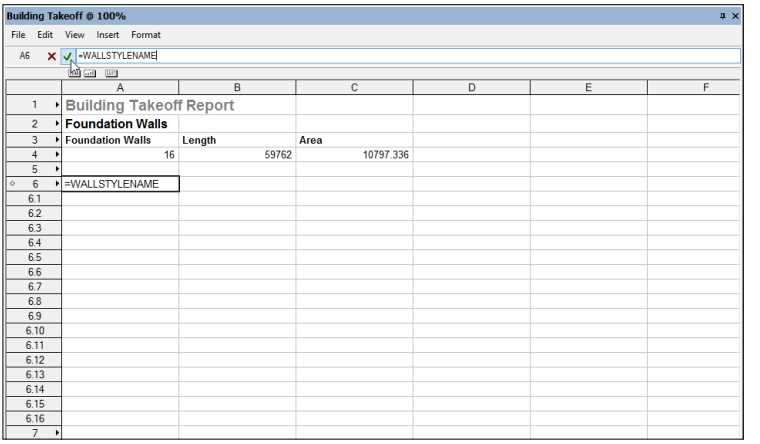
- This time Vectorworks is found the same 16 walls.
- You might notice that row number 6 now has whole new set of rows underneath labelled 6.1 to 6.16.
- Each row represents one wall.
- Row number 6 is known as the **Database Header**. This is a special row that has all of the formulas entered into it. The rows below it will show the information from each wall.
- In row **A6**, type in =.
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Function…**



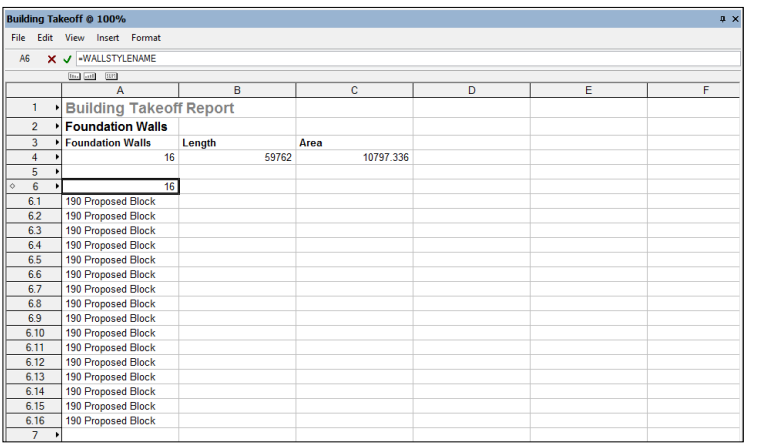
- There is a function that will report the wall style name for all of these walls.
- Scroll down the list of functions until you find **WallStyleName**.
- Click on this function once, then click on the **OK** button.



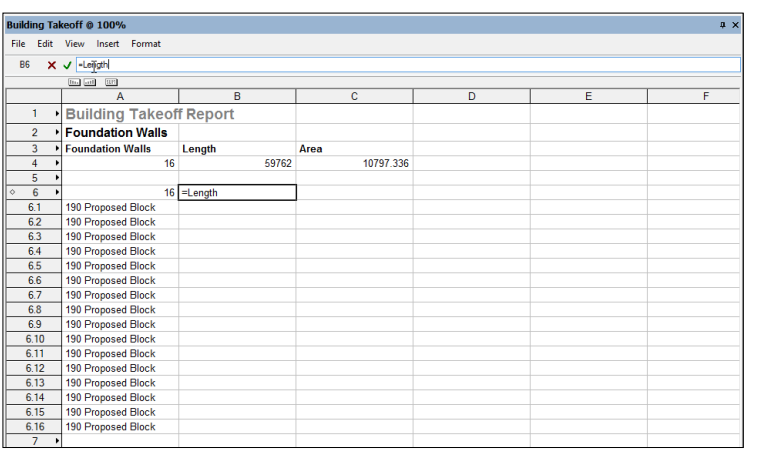
- Remember to click on the green tick next to the formula bar.



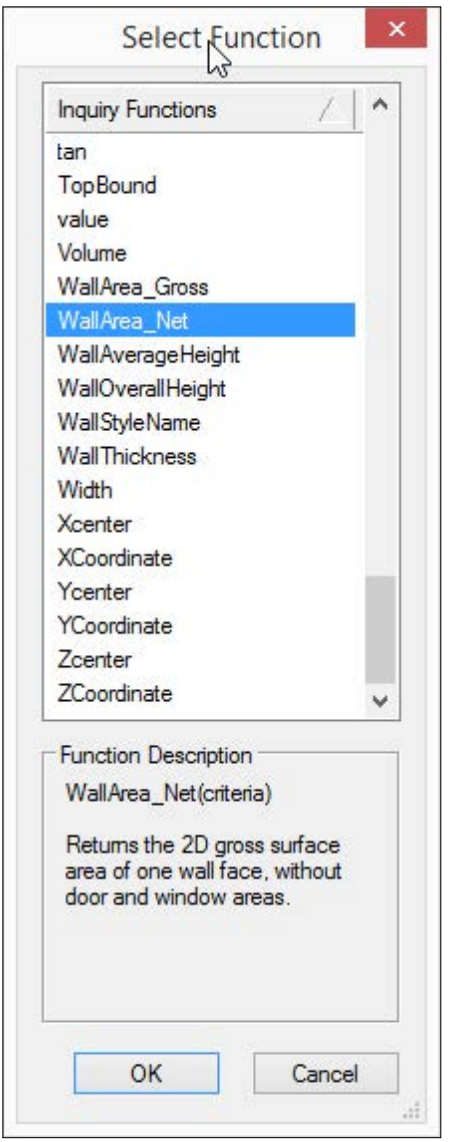
- You should now see all of the wall style names of the objects that meet your criteria.



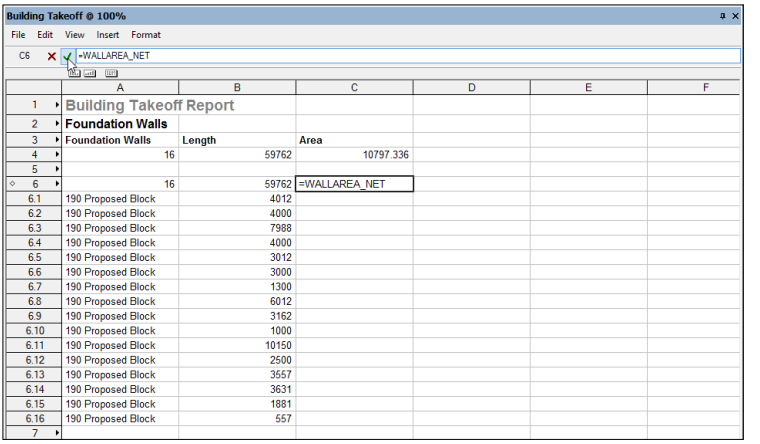
- When you use a database to find all of the walls, you do not have to type a complex formula into the worksheet to find the lengths of all these walls.
- By inputting a short formula ("**= Length**"), the worksheet will apply at two each object that has been located.
- Click on the green tick to complete this formula.



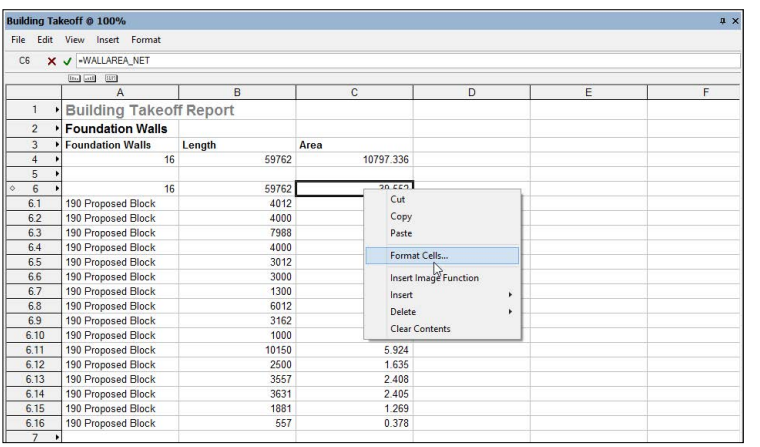
- Click on the next cell for the wall area.
- Go to the **Menu** bar on the worksheet window.
- Click on **Insert > Function…**
- There is a function that will report the net wall area for all of these walls.
- Scroll down the list of functions until you find **WallArea_Net**.



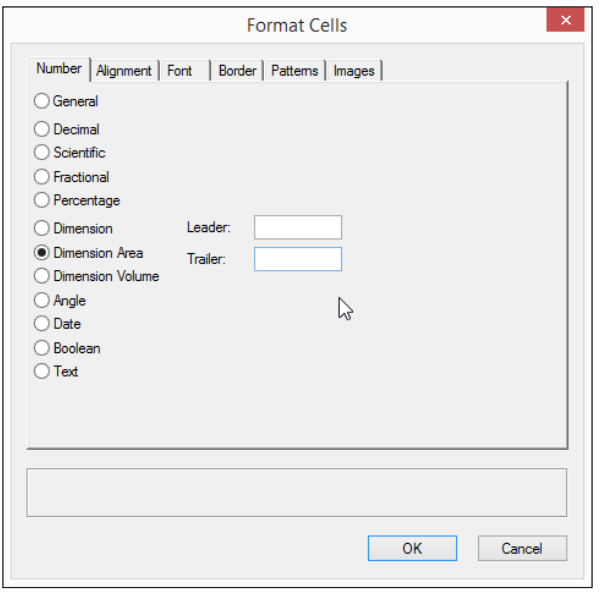
- Click on this function once, then click on the **OK** button.



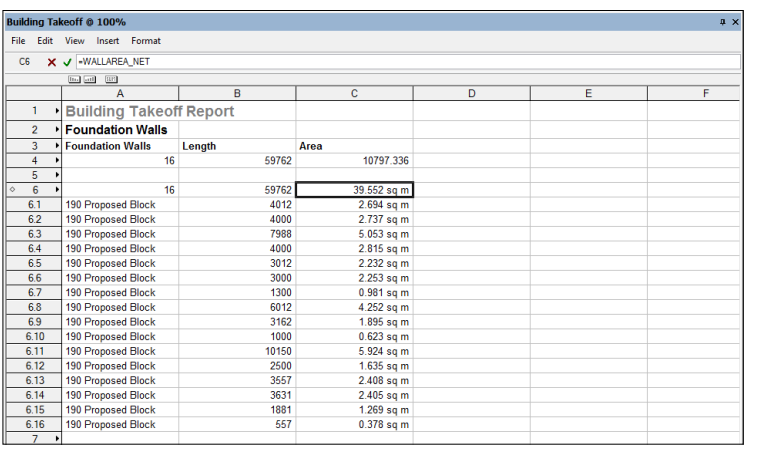
- Click on the green tick.
- The worksheet will now calculate the net wall area for each individual wall.
- The cells do not have formatting information which can make them hard to read.
- Right click on the area calculation cell and choose **Format Cells…**



- If you have set up your document units correctly, you can use **Dimension Area**. Using Dimension Area will set the formatting of the cell to match the dimension area formatting of the document. so it is useful to set your document units correctly.



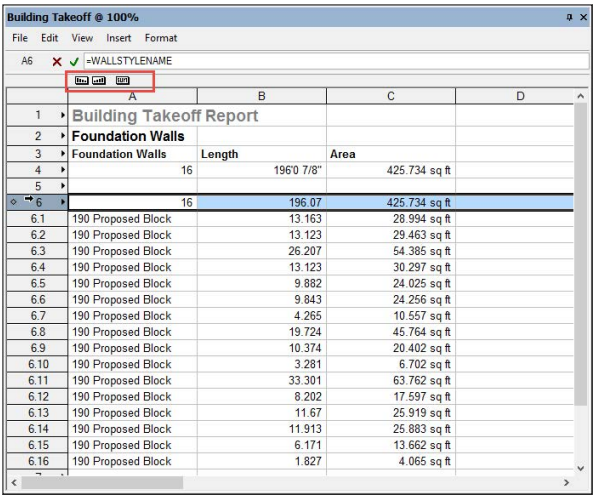
- Click on the **OK** button to return to the worksheet.



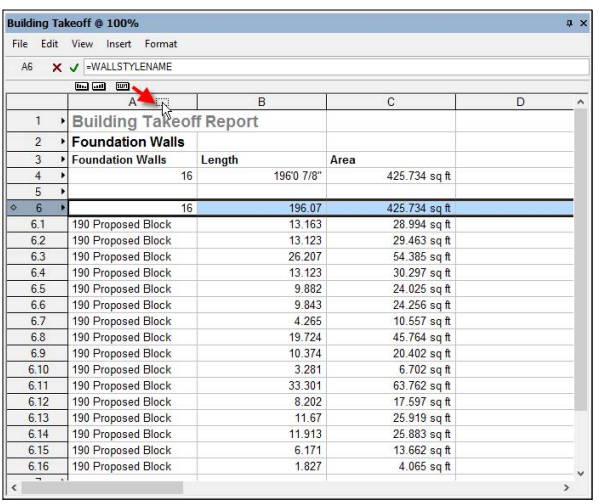
	A	B	C	D	E	F
1	Building Takeoff Report					
2	Foundation Walls					
3	Foundation Walls	Length	Area			
4	16	59762	10797.336			
5						
6	16	59762	39.552 sq m			
6.1	190 Proposed Block	4012	2.694 sq m			
6.2	190 Proposed Block	4000	2.737 sq m			
6.3	190 Proposed Block	7988	5.053 sq m			
6.4	190 Proposed Block	4000	2.815 sq m			
6.5	190 Proposed Block	3012	2.232 sq m			
6.6	190 Proposed Block	3000	2.253 sq m			
6.7	190 Proposed Block	1300	0.981 sq m			
6.8	190 Proposed Block	6012	4.252 sq m			
6.9	190 Proposed Block	3162	1.895 sq m			
6.10	190 Proposed Block	1000	0.623 sq m			
6.11	190 Proposed Block	10150	5.924 sq m			
6.12	190 Proposed Block	2500	1.635 sq m			
6.13	190 Proposed Block	3557	2.408 sq m			
6.14	190 Proposed Block	3631	2.405 sq m			
6.15	190 Proposed Block	1881	1.269 sq m			
6.16	190 Proposed Block	557	0.378 sq m			
7						

At the moment, all of our walls are being reported individually. If this is what you require, then you have the information. However, this may create a very long report, and it is possible to shorten the report if required.

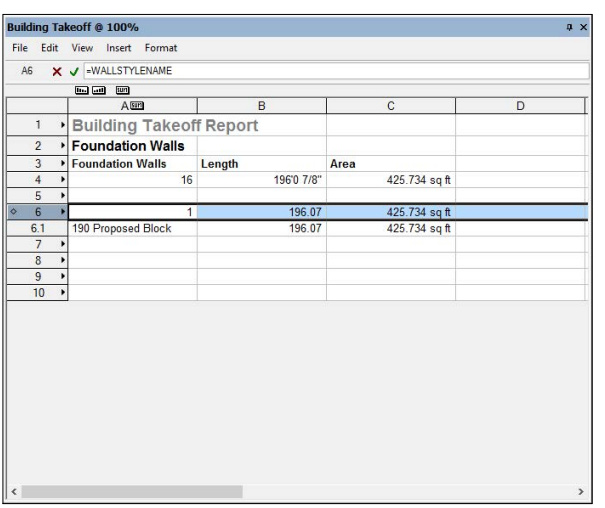
- Click on the row that is the database header (the one with the diamond). In this case that is row 6.
- You should notice three new icons that have appeared just above column A. These icons control sorting and summing. It is the **Sum** icon that we need.



- Click and drag the sum icon to the top of **column A**.



- When you sum a column, you are telling Vectorworks to combine all the objects that are the same (in this case they have the same wall style name).
- You will notice that the lengths and areas have now been combined.

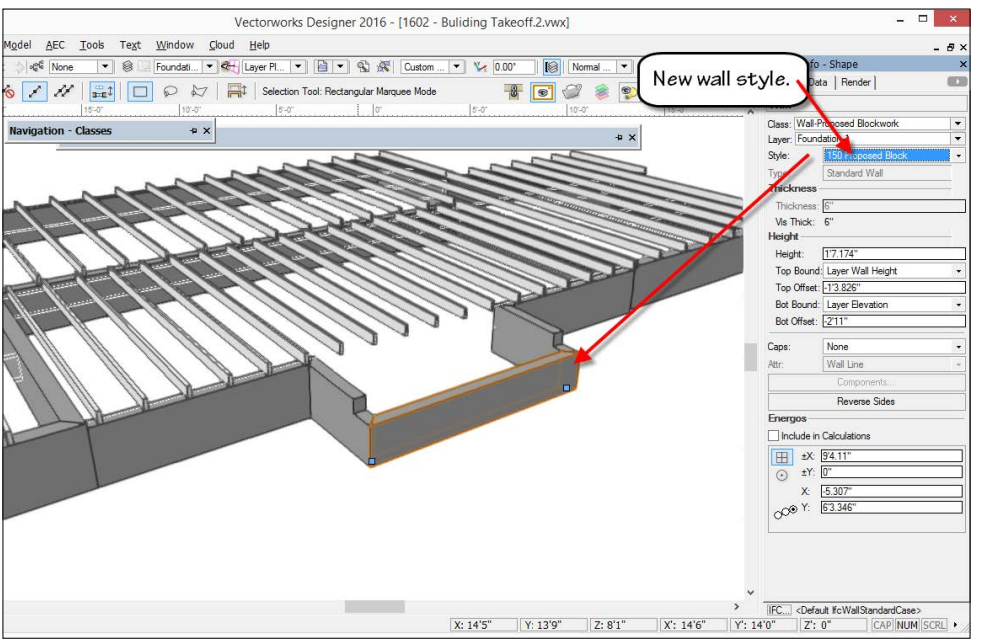


There is a fundamental difference between the style of worksheet (the database) and the first worksheet that we made.

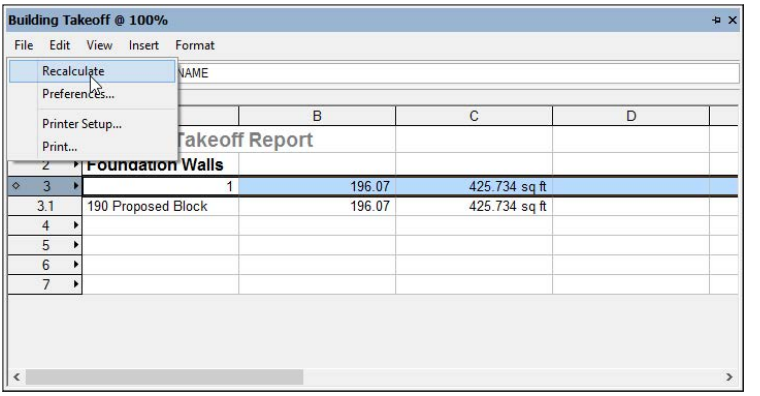
In the first worksheet we used the class to find the walls. This is okay provided we do not need to have any more information about these walls. if we have different wall thicknesses or different wall styles, these will be combined together with the original walls that are in the worksheet. This might lead to some confusion if we have different wall thicknesses (wall styles) that have the same class.

We could add additional rows to look for new foundation wall classes, but this is complex and it is also prone to error.

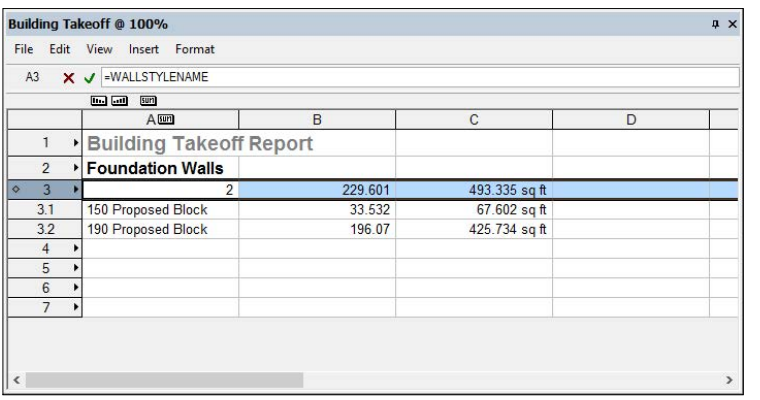
In the second worksheet we have told Vectorworks to find any walls that are on the correct class and combine together all the walls that are the same style. If we create a new wall style that use the same class, it will be shown on the worksheet as a separate row.



For example, we could have different wall thicknesses for our foundation walls depending on the loads that they have to support. Our second worksheet would automatically group the different wall styles together so you could see the total lengths and areas of each wall style.



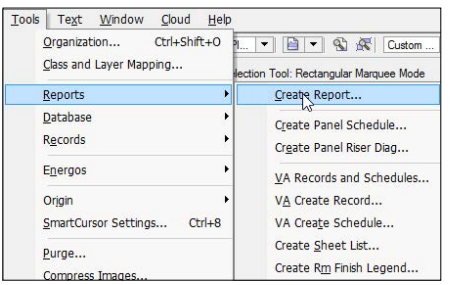
Because the second worksheet would work automatically, it would save us a lot of time, and more importantly, it would save us from making errors.



Floor Framing

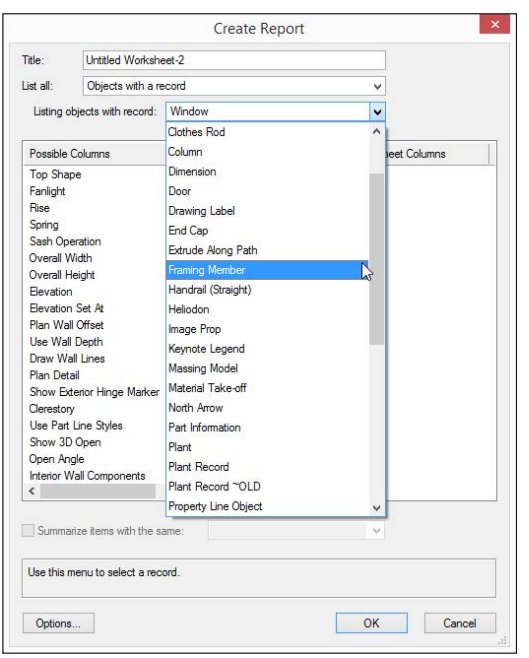
Another part of the foundations that we have to report is the timber structure that will be supporting the floor. In this case we will be looking for objects that do have information attached, such as joists, bearers, and piles (piers). These objects have data attached, so we can use the database technique. Because of the type of object, we can use a faster way to create the worksheet as well.

- Go to the **Menu** bar
- Choose **Tools > Reports > Create Report...**



- Click on the pop-up menu to choose **Framing Member**.

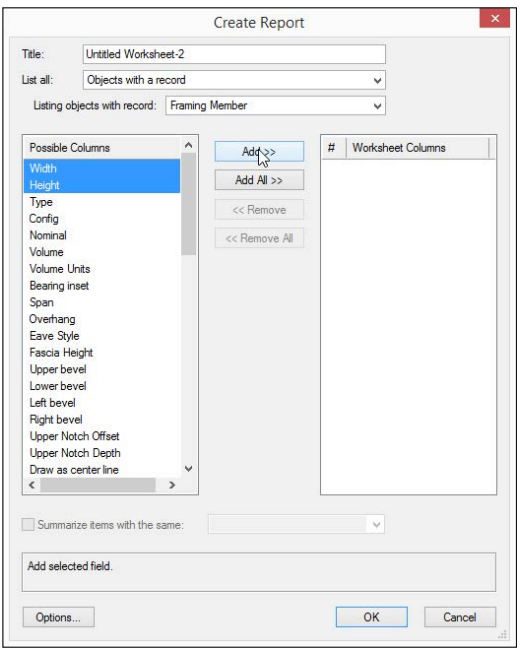
This dialog box is very powerful because it allows you to choose from a long list of objects to create a report on them. You might notice the not every object in Vectorworks is listed here, walls for example are not shown. But if an object is shown in this list, you can use this dialog box to create a report on those objects and you can choose from any of the attached data.



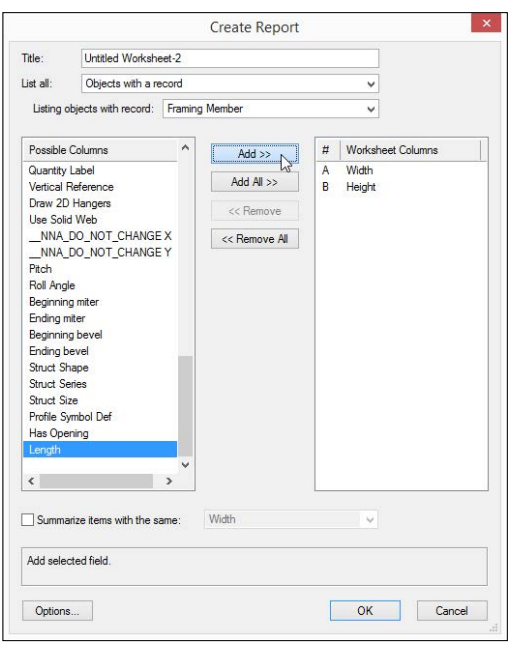
- After you have chosen Framing Member, you will notice that the left-

hand side of the dialog box now displays all the available information. The technique to use here is to select the information that you want to add to your worksheet, then click on the **Add>>** button to add it to the right-hand column of the dialog box.

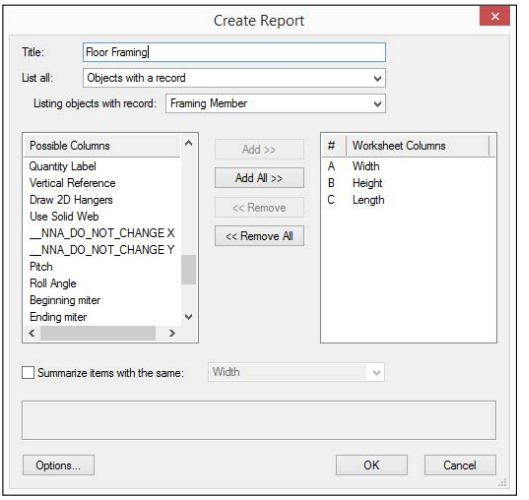
- at the top of the list you will find the Width and Height. These two fields relate to the width of the framing member and the height of the framing member, not the height of the framing member above zero(elevation).
- Click on the **Add>>** button.



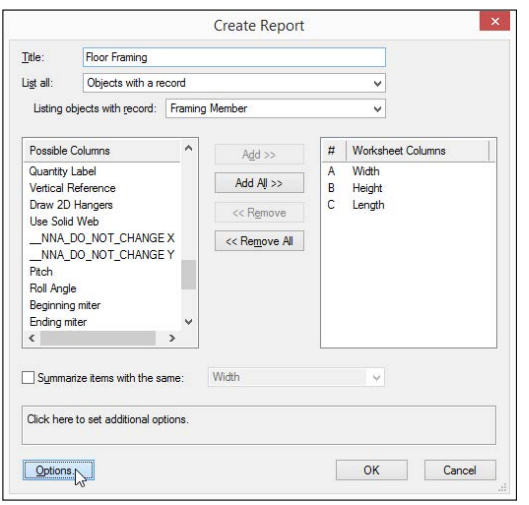
- Scroll down to the bottom of the dialog box and click on Length.
- Click on the **Add>>** button.



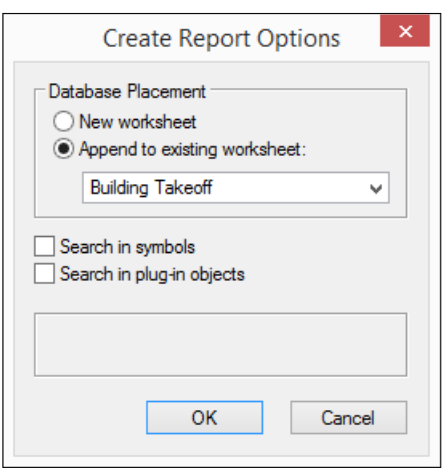
- Scroll up and down the list carefully to ensure that there is no other information that you want to edit your report.



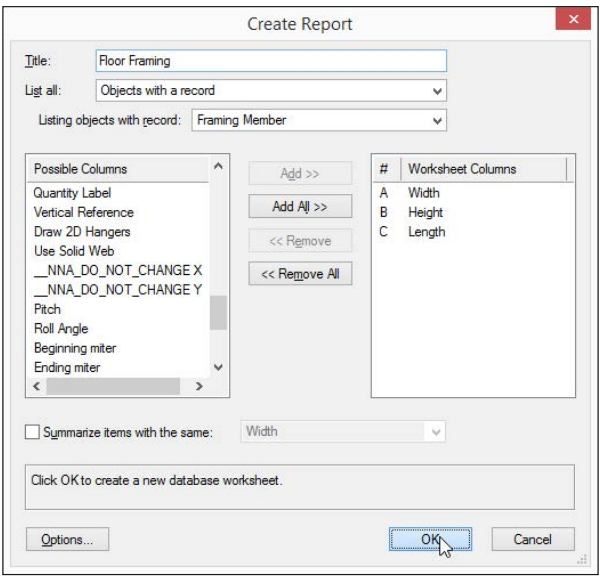
- At the bottom of the dialog box click on the **Options…** button.



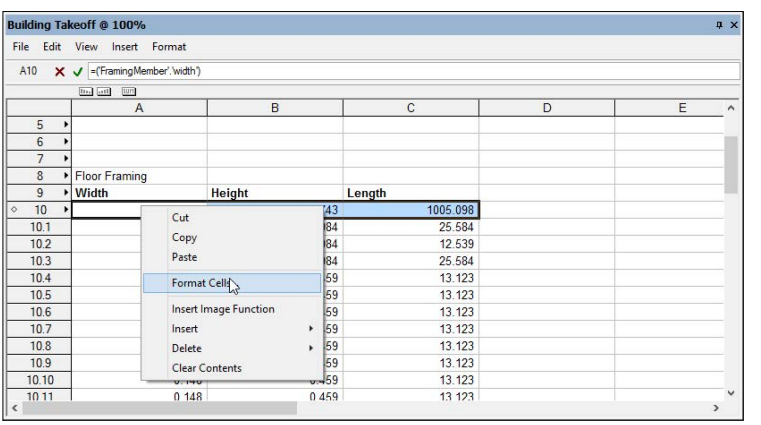
- Click on the radio button to **Append to existing worksheet**.
- From the pop-up menu choose your building takeoff worksheet.



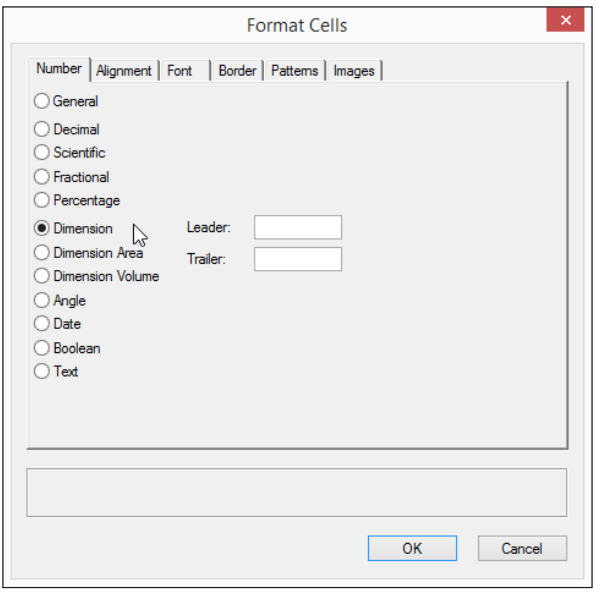
- Click on the **OK** button to return to the Create Report dialog box.



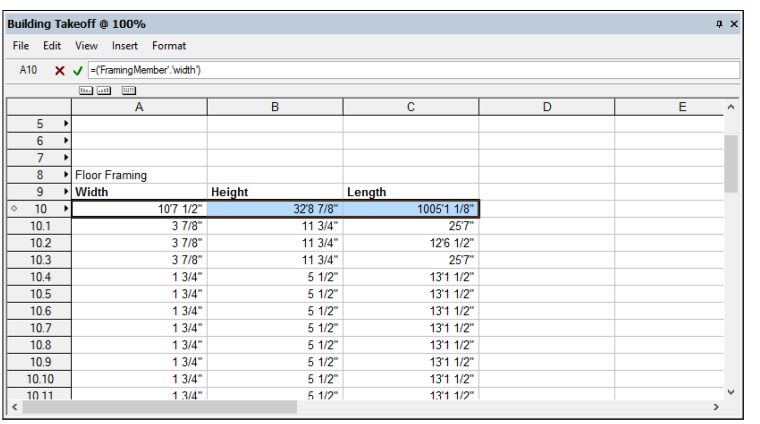
- Click on the **OK** button to return to the worksheet.
- You should notice that all the framing members have now been added to the worksheet.
- Select the database header row for the framing members.
- Right click on one of the cells and choose **Format Cells…**



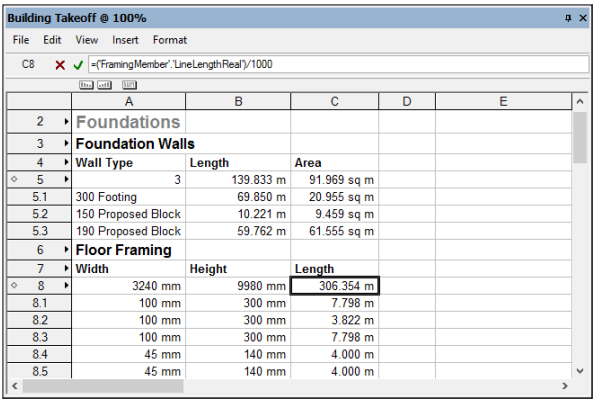
- Format the cells for a dimension.



- Click on the **OK** button to return to the worksheet.
- This image shows imperial measurements, which are in both feet and inches.

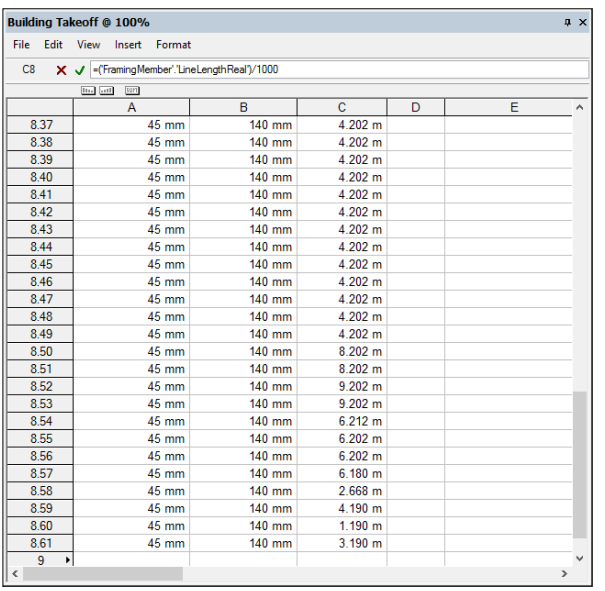


- If you are using a metric file you will need to set the width and height to Dimension units, but you might find the length is better if you converted to metres first and then add the unit mark to it.



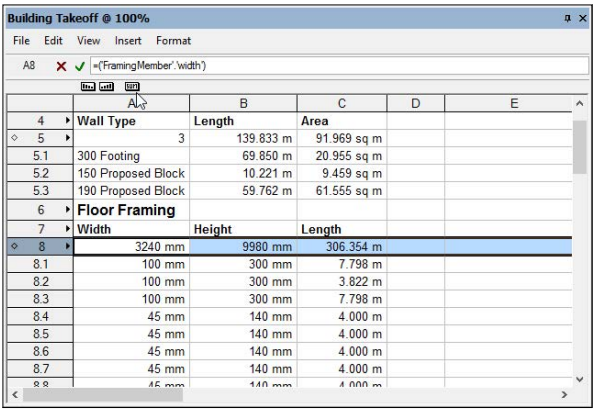
	A	B	C	D	E
2	**Foundations**				
3	**Foundation Walls**				
4	**Wall Type**	**Length**	**Area**		
5	3	139.833 m	91.969 sq m		
5.1	300 Footing	69.850 m	20.955 sq m		
5.2	150 Proposed Block	10.221 m	9.459 sq m		
5.3	190 Proposed Block	59.762 m	61.555 sq m		
6	**Floor Framing**				
7	**Width**	**Height**	**Length**		
8	3240 mm	9980 mm	306.354 m		
8.1	100 mm	300 mm	7.798 m		
8.2	100 mm	300 mm	3.822 m		
8.3	100 mm	300 mm	7.798 m		
8.4	45 mm	140 mm	4.000 m		
8.5	45 mm	140 mm	4.000 m		

- In this image you can seethat all the framing members have been found and they are shown in the report. You might also notice that they are all shown as individuals.

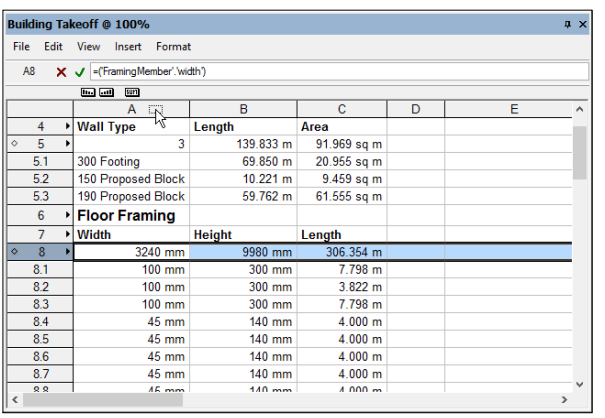


	A	B	C	D	E
8.37	45 mm	140 mm	4.202 m		
8.38	45 mm	140 mm	4.202 m		
8.39	45 mm	140 mm	4.202 m		
8.40	45 mm	140 mm	4.202 m		
8.41	45 mm	140 mm	4.202 m		
8.42	45 mm	140 mm	4.202 m		
8.43	45 mm	140 mm	4.202 m		
8.44	45 mm	140 mm	4.202 m		
8.45	45 mm	140 mm	4.202 m		
8.46	45 mm	140 mm	4.202 m		
8.47	45 mm	140 mm	4.202 m		
8.48	45 mm	140 mm	4.202 m		
8.49	45 mm	140 mm	4.202 m		
8.50	45 mm	140 mm	8.202 m		
8.51	45 mm	140 mm	8.202 m		
8.52	45 mm	140 mm	9.202 m		
8.53	45 mm	140 mm	9.202 m		
8.54	45 mm	140 mm	6.212 m		
8.55	45 mm	140 mm	6.202 m		
8.56	45 mm	140 mm	6.202 m		
8.57	45 mm	140 mm	6.180 m		
8.58	45 mm	140 mm	2.668 m		
8.59	45 mm	140 mm	4.190 m		
8.60	45 mm	140 mm	1.190 m		
8.61	45 mm	140 mm	3.190 m		
9					

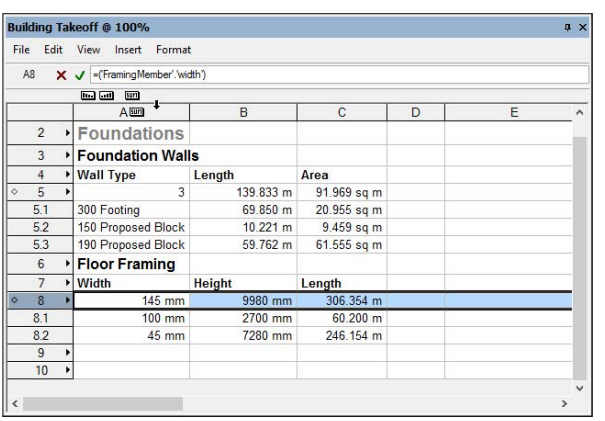
- If you show each individual framing member, you will end up with a very long report. You may want to collect all of the framing members together that have the same width.
- Ensure that you have clicked on the Database Header row (the row with the diamond). In this case the header row is row number 8.
- When you select the database header row, three icons will appear above column A.
- The first two icons relate to sorting and the third icon is called Sum. This icon will gather together all objects that have the same information.



- Drag the Sum icon to column A (this is the width column).
- Release the mouse button when your cursor is on column A.

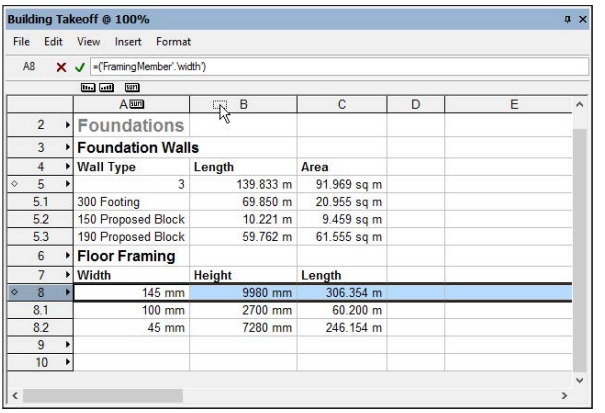


- All the framing members that have the same width are now collected together.
- You will notice that the length column now gives you the total length of all of the objects that have the same width.

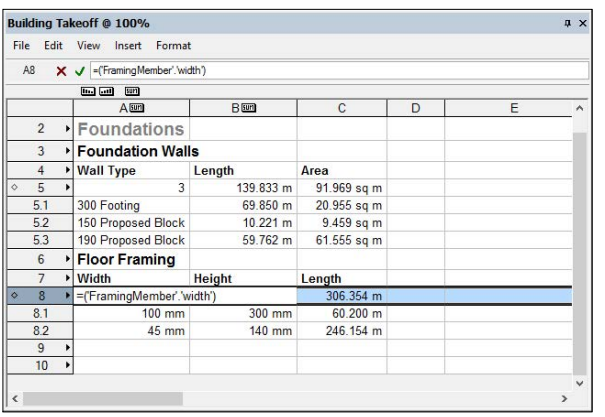


- You could easily get a situation where framing members have the same width but a different height. In the report at the moment all the framing members with various heights are collected together because they have the same width.

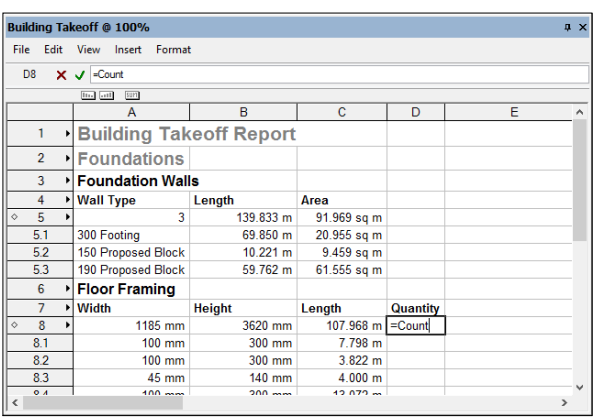
- Ensure that you have clicked on the Database Header row (the row with the diamond). In this case the header row is row number 8.
- Drag the Sum icon to column B (this is the height column).



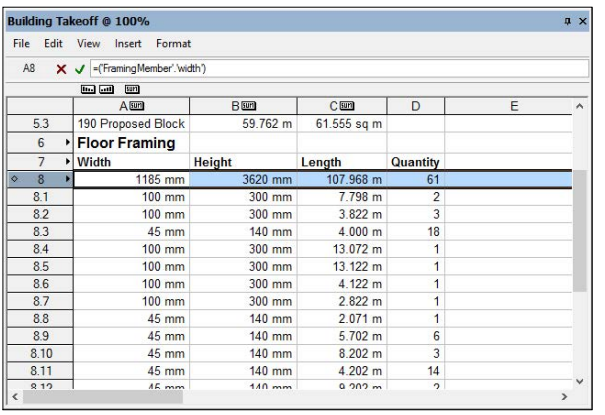
- Release the mouse button when your cursor is on column B.although we do not have various heights for each width, it is a real possibility that we could have in the future. Creating your worksheet in this way will protect you from mistakes in the future.



- Some people wish to know how many framing members there are of the same length. We can apply the same technique to the length column as well, but before we do that we need to add a quantity label and a count function to a worksheet.



- Ensure that you have clicked on the Database Header row (the row with the diamond). In this case the header row is row number 8.
- Drag the Sum icon to column C (this is the height column).
- Release the mouse button when your cursor is on column C.

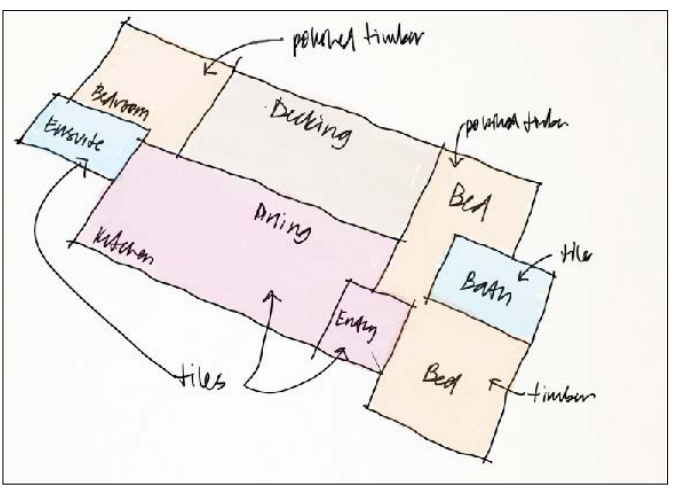


	A	B	C	D	E
5.3	190 Proposed Block	59.762 m	61.555 sq m		
6	**Floor Framing**				
7	**Width**	**Height**	**Length**	**Quantity**	
8	1185 mm	3620 mm	107.968 m	61	
8.1	100 mm	300 mm	7.798 m	2	
8.2	100 mm	300 mm	3.822 m	3	
8.3	45 mm	140 mm	4.000 m	18	
8.4	100 mm	300 mm	13.072 m	1	
8.5	100 mm	300 mm	13.122 m	1	
8.6	100 mm	300 mm	4.122 m	1	
8.7	100 mm	300 mm	2.822 m	1	
8.8	45 mm	140 mm	2.071 m	1	
8.9	45 mm	140 mm	5.702 m	6	
8.10	45 mm	140 mm	8.202 m	3	
8.11	45 mm	140 mm	4.202 m	14	

Flooring

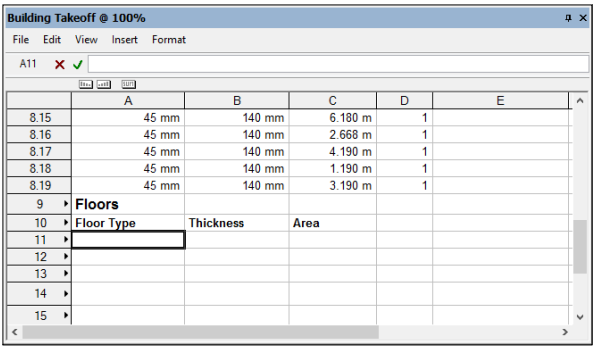
In this project the floors have been created with slab objects. Again I have to point back to the idea that you need to design your report before you can carry out the steps. In my case I've decided that I want to report the total area and the thickness of my flooring. However, you may want to report different areas that have different floor finishes on them, in that case, you may be using polygons for the floor areas or you may be using different slabs. In either case, you need a way of picking up the information that relates to the floor finishes. It may be that using classes is a suitable way of separating the different floor finishes.

This is where you need to go back to your design of your building takeoff report. Then you design do you need to report all of the different floor finishes or do you just need to report the overall structural area of the floor. This might not seem like a substantial difference, but if you do not report the right information your building takeoff is useless.

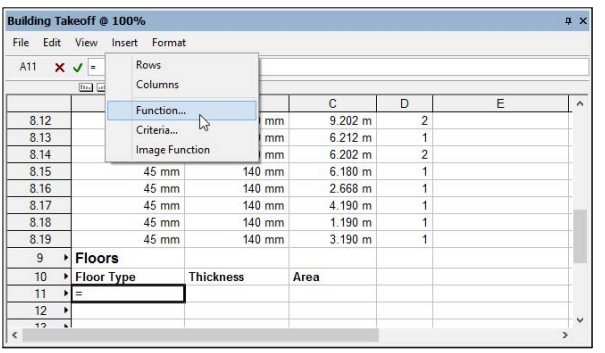


In this case I will be reporting to different areas, the main floor area and the decking area. These two areas have been separated by using different slab Styles, but I will be looking for these areas by their class. If you would like to report many different areas of different floor finishes but use the same slab style, then you should use a similar strategy where you separate the floor types by class. Separating your floor finishes by using different classes is a good strategy to control the graphic style as well as the building takeoff reporting. Using a different slab style for each will finish will make it difficult to manage your slab styles.

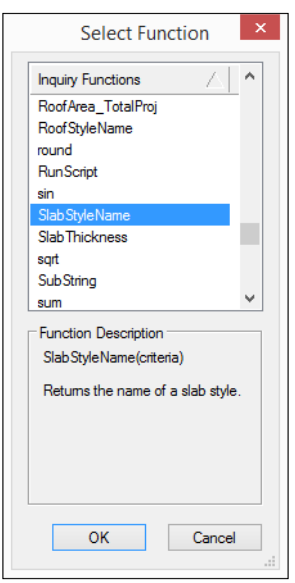
- The first step is to it at your current building takeoff report to add a title for the floor reporting.
- Add labels for the floor type the floor thickness and the area (or the other things that you want to report).
- Click once in the required cell for the floor type.



- On the worksheet menu bar click on **Insert > Function…**



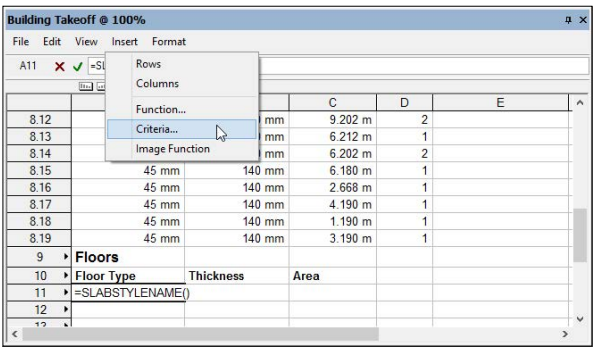
- We are looking for objects that have a slab style name, scroll down to find the function for **SlabStylename**. This function will look for all slabs that mention a specific criteria (in this case the class) and report the name of that slab style. If you are using classes only, then in this cell type in the name for that floor finish.



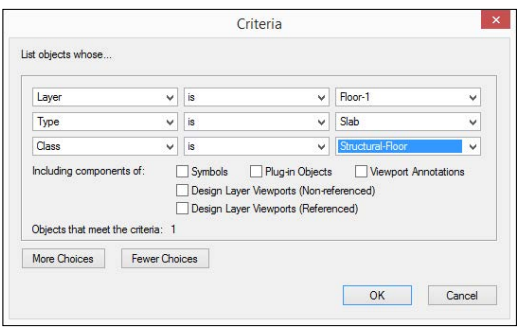
- Click on the **OK** button to return to the worksheet.
- The function is incomplete because it needs to know what objects to look for (the criteria). Vectorworks knows that it is looking for a slab, but it needs to know something about the slab in order to find it. In this

case sitting a criteria for a class should find the slab.

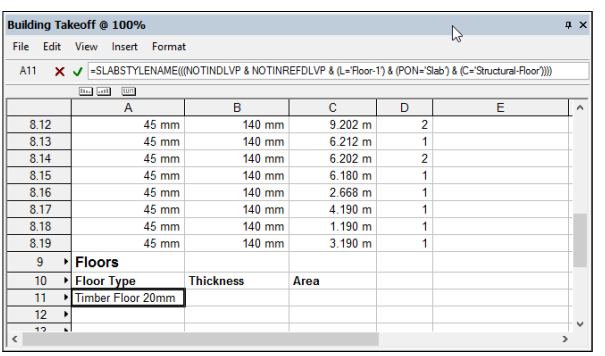
- On the worksheet menu bar click on **Insert > Criteria…**



- We do not want Vectorworks to find slabs that are in the wrong layer, so set criteria that will look for slabs in the correct layer that have the appropriate class. In this case I am looking for objects on the Floor-1 layer, that are slabs , and are in the class Structural Floor.

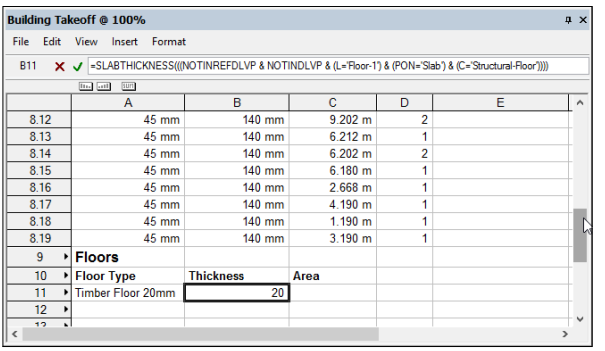


- Click on the **OK** button to return to the worksheet.

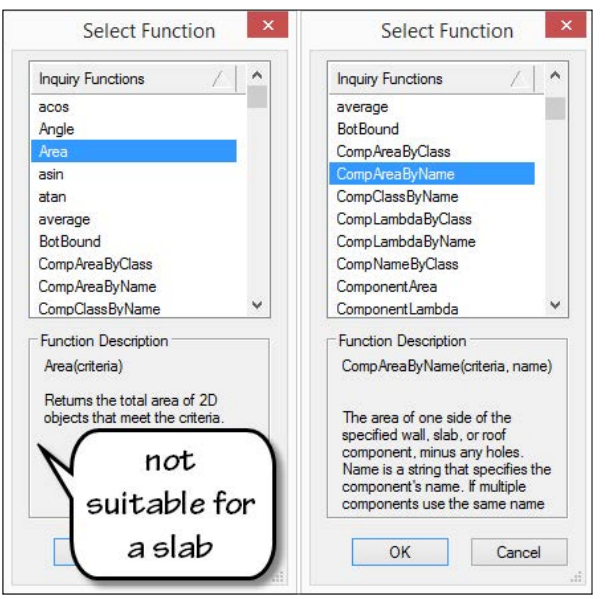


- The next step is to find the thickness of the slab.
- Go to the **Menu** bar on the worksheet window.
- Choose **Insert > Function…**
- Look for a function that will report the slab fitness. Scroll down towards the bottom of the function dialog box, the function is called **SlabThickness** and will report the overall thickness of the slab. If you are choosing to report just a component of the slab, then choose the appropriate function that will report a component fitness.

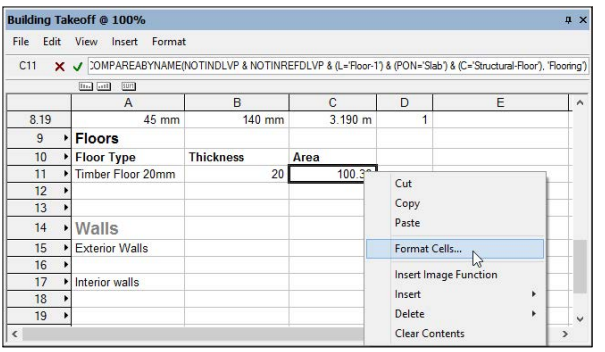
- Add the same criteria that you added for the slab name. You can copy and paste the criteria from one cell to another. If you do not use exactly the same criteria you run the risk of reporting the wrong information.



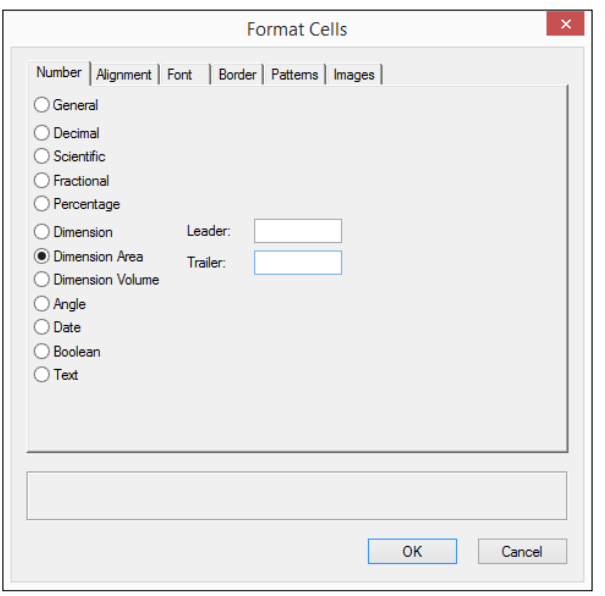
- When you come to measure the area of the slab, you must use the **CompAreaByName** function, but if you are using polygons then you must use the Area function. If you look carefully at the function description, you will notice that the Area function on the reports the area of to the objects, which means that it will not report the area of a slab.



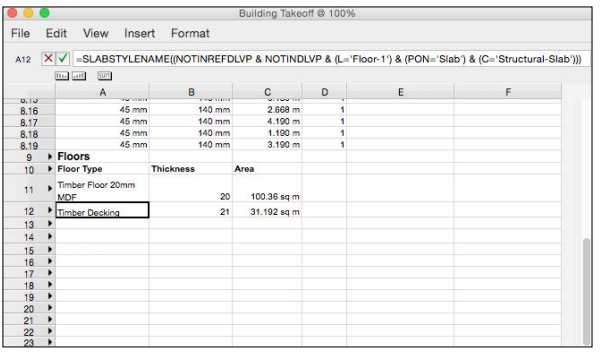
- Remember to format the cells so that the numbers make sense.
- Right-click on the cell and choose **Format Cells…**



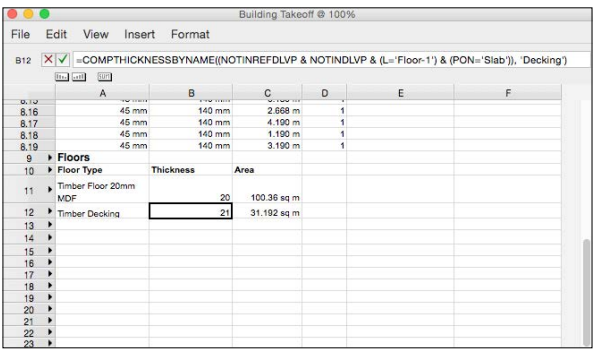
- For the area calculation you can use the Dimension Area format. This is a quick way to add the correct area units to your cell. Other cells may need to be formatted as decimals with a trailer that represents the correct units.



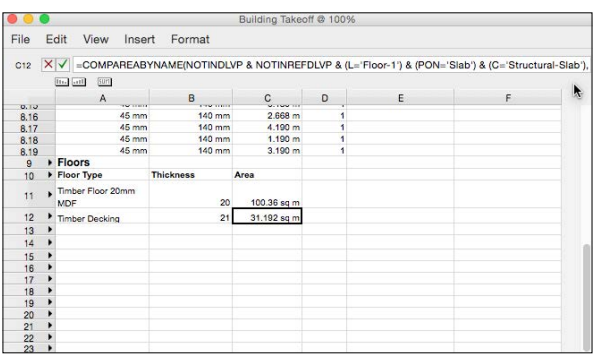
- If you have other areas that you need to report you will need to create reporting functions for those areas. The way I have set up my calculation of the moment limits my reporting to slabs that have the same class. My report will give me the total area of all the slabs that are on the same class, but it will not report slabs that are in a different class.
- An easy way to get started is to copy the entire run from your first slab calculation.
- Paste that into the worksheet row below. You need to edit the class and the component name in order to report the correct areas.



- Remember correctly the criteria for the thickness calculation.



Remember correctly the criteria for the area calculation.



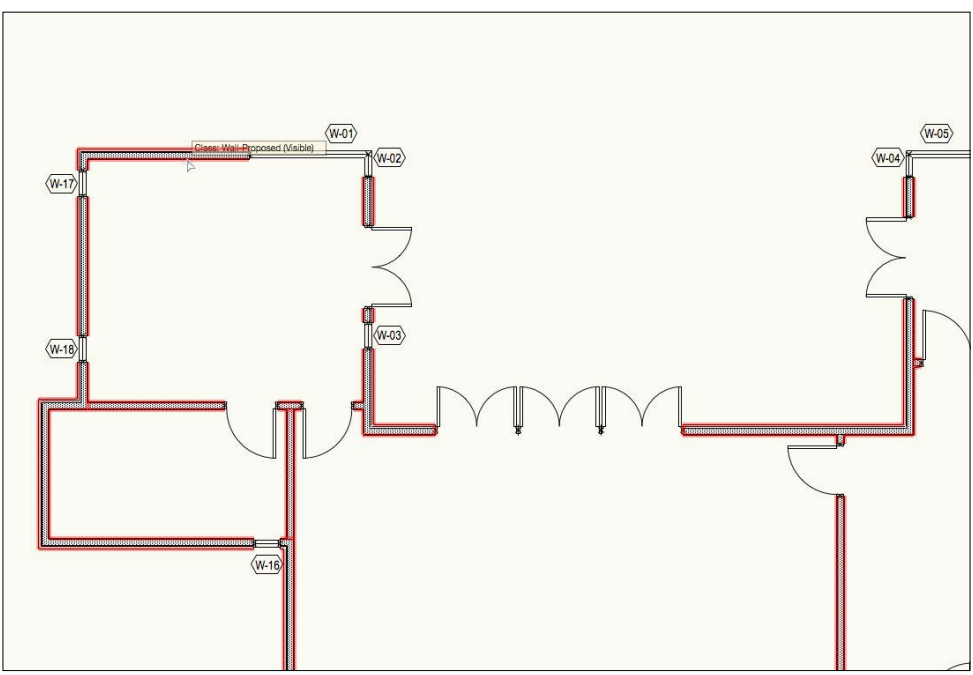
Walls

Refer back to your building takeoff report design. If you need to calculate the area of the exterior wall component, then you will have to find all of the exterior walls and then get Vectorworks to report just the areas of the exterior components. This does mean you will have to drill your walls using components for the interior, structural, and exterior parts of the wall. If you have not created your walls this way then you will not be able to find the information you require.

If you are using sheet material to the exterior of your walls, then you might want to calculate the number of sheets required. This again comes back to the way you have designed your takeoff report.

One possible way of doing this is to have all of the walls on the same class, but look for the component for the exterior wall.

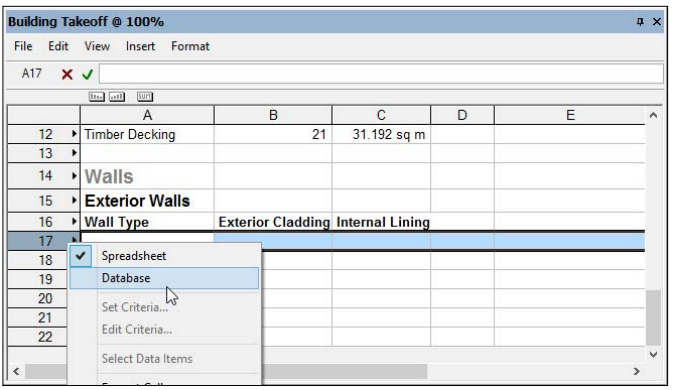
In this image you can see that all of the walls have the same class (Wall – Proposed). So is there any downside and having all of the walls on the same class? If you wanted to separate the structure of the exterior walls and the interior walls, and having all the walls on the same class might be challenging, because this seems to be nothing to separate the different walls. In reality the interior and exterior walls are different wall styles and the wall style can be used as a criteria.



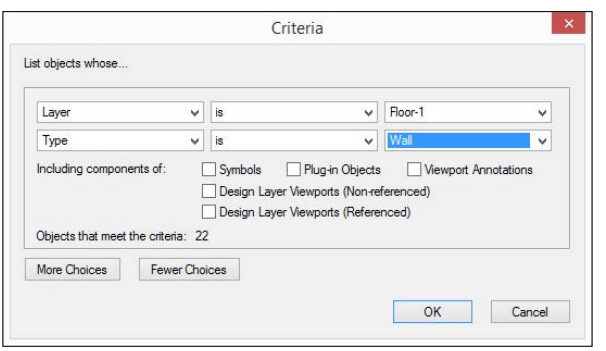
- We want to be sure that later on when we had the design we don't lose any walls from our report. The easiest way to ensure this is to make your report into a database.
- Create headings for the walls, wall type, exterior cladding, interior

lining, and any of the other parts that you want to report.

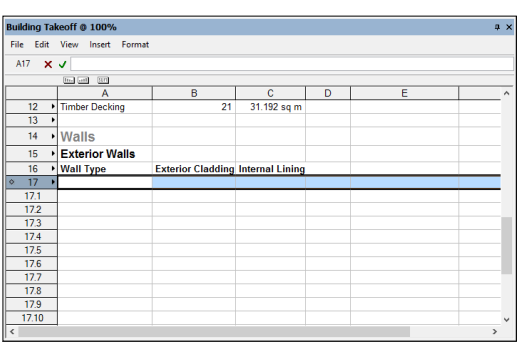
- Go to the next row down.
- Right click.
- Choose **Database**.



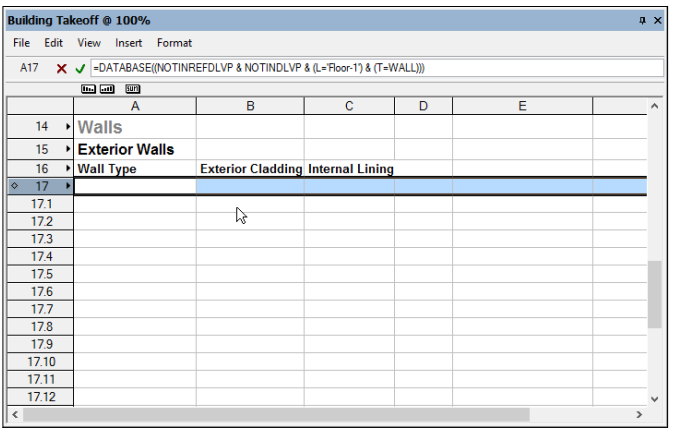
- if you have anything selected you will get a dialog box with a list of options. If this happens click on the **Custom...** button.
- In the Criteria dialog box choose the criteria for selecting the walls on the appropriate layer. In this case I have chosen one layer (Floor-1) and the type is Wall. This will select all of the walls regardless of their class or wall style.



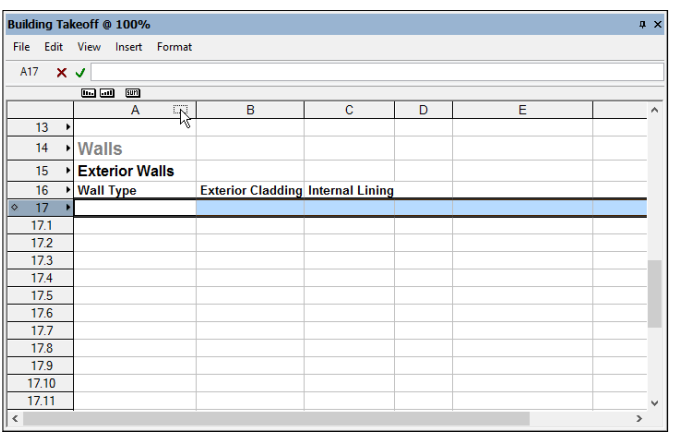
- Click on the **OK** button to return to the worksheet.
- In the previous dialog box it showed that 22 objects would meet the criteria. The worksheet now shows all of those objects, one for each row.



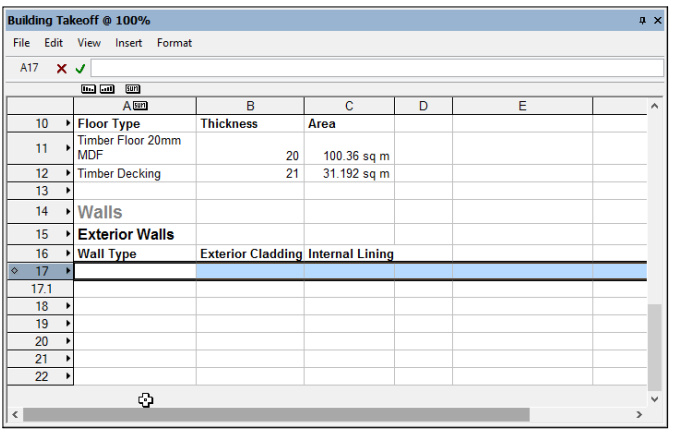
- If you click on the row, you will see in the formula bar the database and the search criteria for your objects. You can edit the search criteria here if you need to.



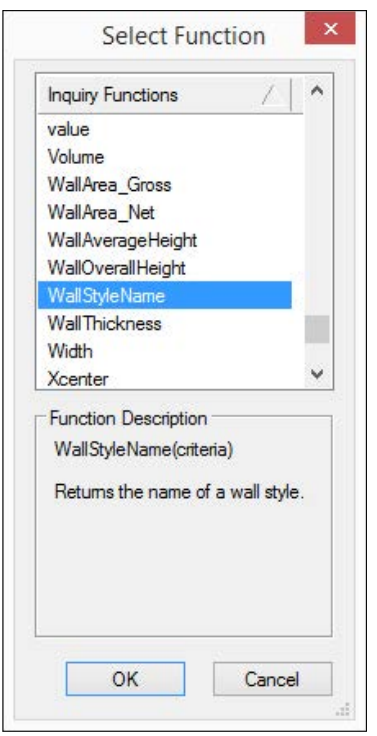
- We currently have every wall individually listed. If you have designed your report to list each wall individually, then you do not have to follow the next step. However, if you want to group all of the same all types together then you will need to follow the step.
- Make sure your database row is selected.
- Drag the sum icon from above column A to column A.



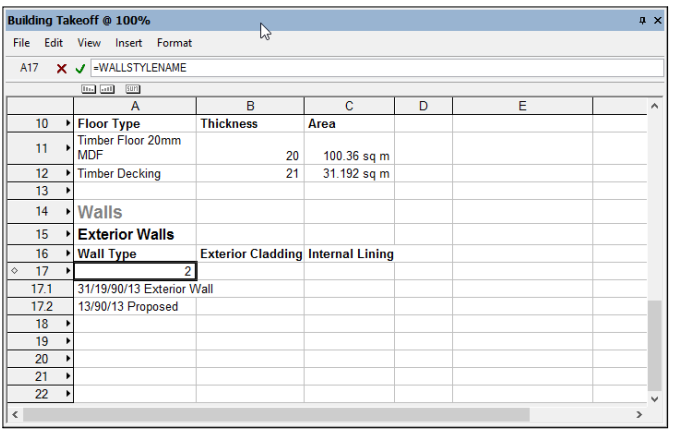
- At the moment this will collect together all of the walls that have the same information in column A. We haven't set the type of information we want in column A, so it will just group all the walls together.



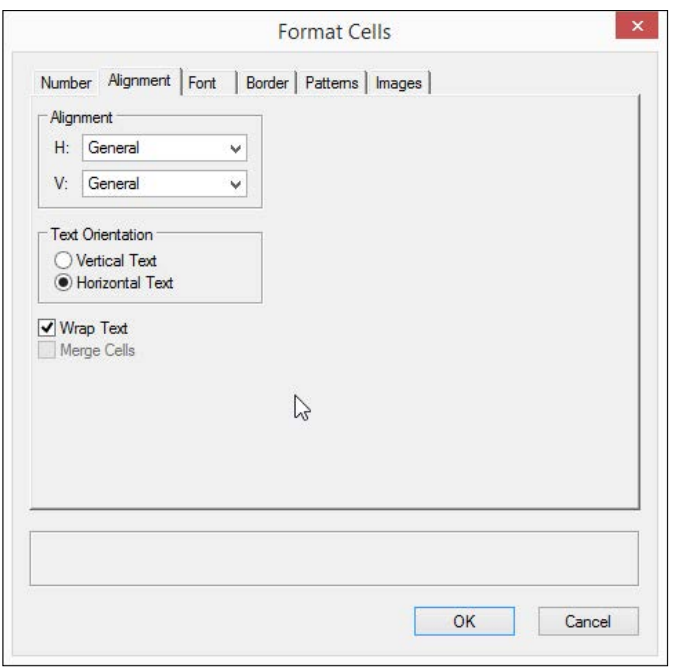
- In column A for the database row add an =.
- On the worksheet window, go to the Menu bar choose **Insert > Function…**
- Scroll down until you find the function, WallStyleName. This function is used to report the wall style name for each wall.



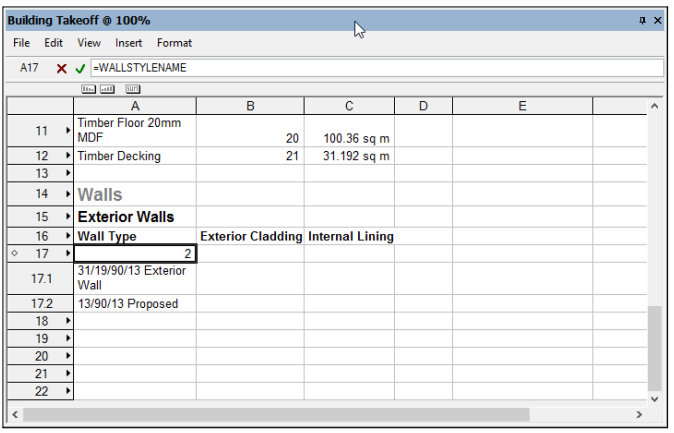
- Click on the **OK** button to return to the worksheet.
- now that we have added this function to column A, and we have previously told Vectorworks to collect together all the items in column A that have the same information, Vectorworks will now collect together all the walls that have the same wall type.
- The advantage of building the worksheet this way is that any new wall styles that are added to the project will automatically be added to our report whenever we recalculate.



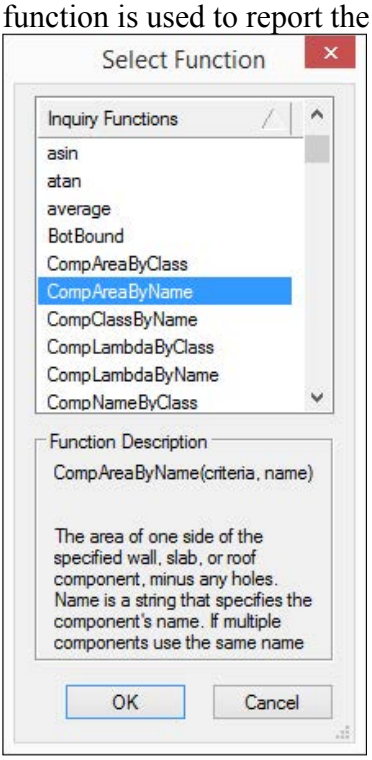
- The wall style names I have created are too long for the cell.
- Right click on the cell for column A which lines up with the database header row.
- Choose **Format Cells…**
- Under the **Alignment** tab choose the option to **Wrap Text**. This will wrap the text inside the cell so that you can see the entire wall style name.



- Click on the **OK** button to return to the worksheet.
- Now you will be able to read the entire name of the wall style.



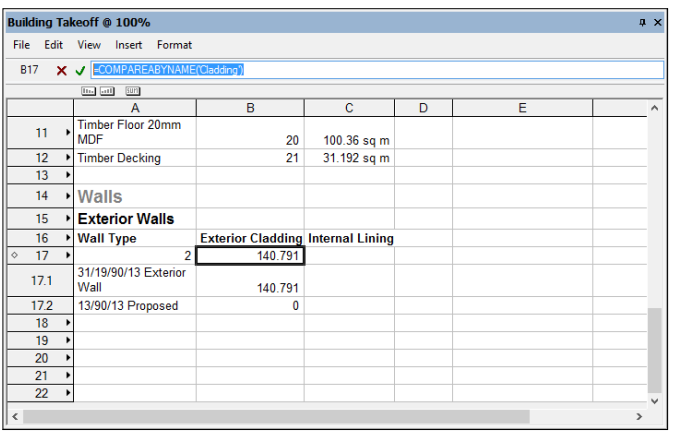
- Now it's time to put in the formula to calculate the exterior cladding and the interior lining. As we saw with the slabs it is not possible to use the area function. We will be using the same function that we used for slabs which calculates the component area by name.
- Go to the cell for the exterior cladding, making sure you're still on the database row.
- Add an =.
- On the worksheet window, go to the Menu bar choose **Insert > Function…**
- Scroll down until you find the function, **CompAreaByName**. This function is used to report the area of one side of the component.



- Click on the **OK** button to return to the worksheet.
- This function will look for walls based on criteria and you will also have

to put the name of the component that you want to report. Because we have used a database to find the walls, we do not have to specify the criteria, but we do have to specify the name of the component.

- The name of the component has to be written in brackets and in single quote marks. If you do not do this correctly, Vectorworks will not find your component.
- Because we are looking for components based on their name, it is essential that when you build your wall styles use consistent naming strategy. If you do not use a consistent naming strategy, Vectorworks will not give you a complete report of all of the components you require.



	A	B	C	D	E
11	Timber Floor 20mm MDF	20	100.36 sq m		
12	Timber Decking	21	31.192 sq m		
13					
14	**Walls**				
15	**Exterior Walls**				
16	**Wall Type**	**Exterior Cladding**	**Internal Lining**		
17	2	140.791			
17.1	31/19/90/13 Exterior Wall	140.791			
17.2	13/90/13 Proposed	0			
18					
19					
20					
21					
22					

- Use the same steps to report the internal lining. Because the the lining component of the exterior and the interior walls has the same name, they will be reported.

Doors and Windows

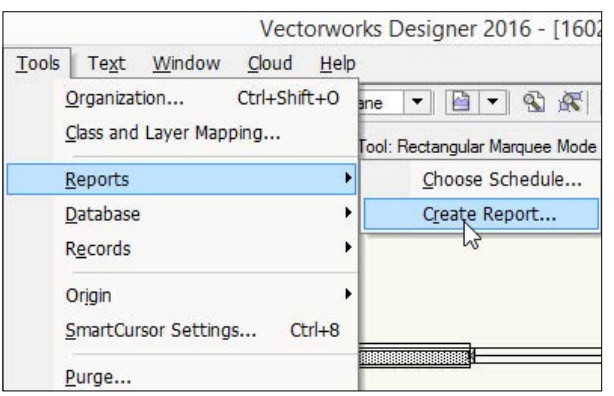
As part of your report you might want to list information about all the doors and windows. If you're using a standard Vectorworks door and window object you will find that you have to create two reports: one for the doors, and one for the windows. If you are using the Windoor object, you can tell the windoor object to assign the windows and doors to the same schedule, allowing you to report them together.

The information that you may want to report about your doors and windows should be part of your design for your building takeoff report. In my case I only want a limited amount of information for doors and windows.

Because of the way these objects are created we can use a different technique to create a database report. This technique is a very quick way to create a report for some objects.

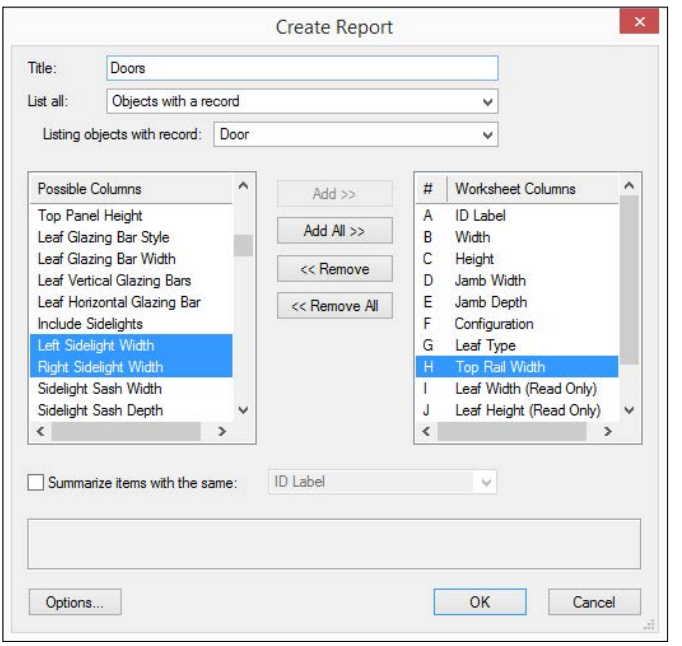
Doors

- Go to the Menu bar.
- Choose **Tools > Reports > Create Report…**

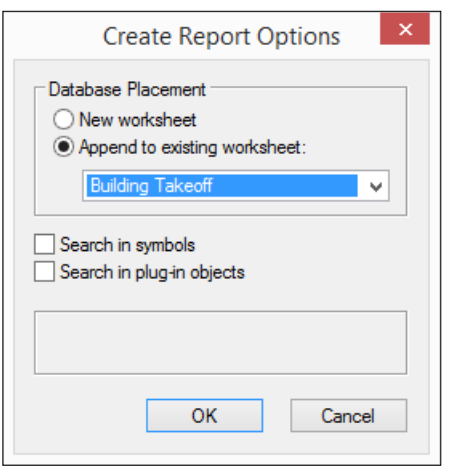


- This command will open a dialog box making it easy to choose the information you want about your doors or windows.
- Give your report a title, in this case of chosen the title Doors. We will be appending this report to our main building takeoff worksheet and this title will be added to the worksheet for us.
- Choose the option from the pop-up menu to List all **Objects with a record**.
- From the pop-up menu choose to list objects with the record **Door.** This is similar to the technique that we used for the framing member.
- On the left side of the dialog box choose the fields that you want to report.

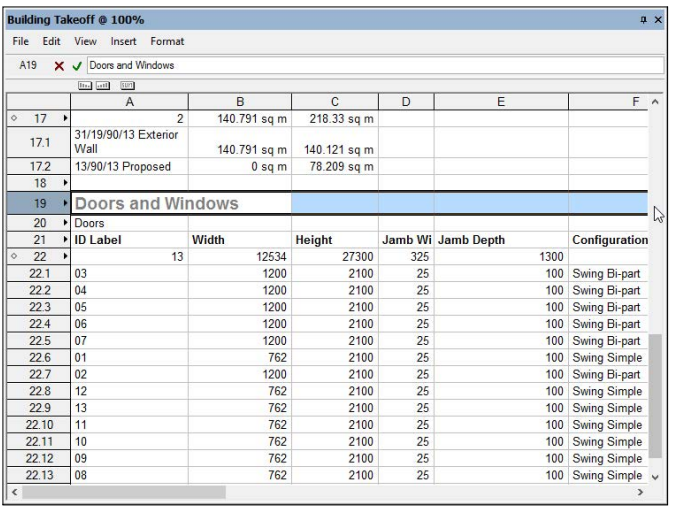
- Click on the **Add>>** button to add those fields to the right side of the dialog box. These are the fields that will be in your report.



- Click on the **Options...** button.
- Choose to **Append to existing worksheet** and choose your building takeoff worksheet from the pop-up list of possible worksheets in the file.

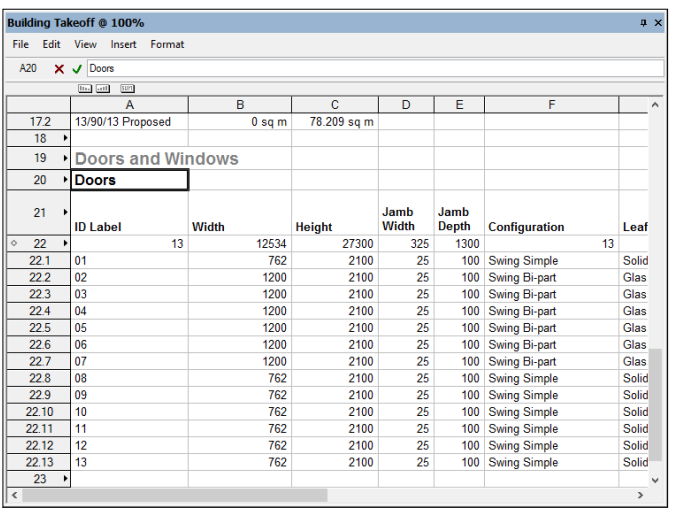


- Click on the **OK** button.
- Click on the **OK** button once more to return to the worksheet.
- You can add an additional label to your worksheet to make it easier to find the doors and windows.
- In this image you can see all the doors have been reported. You might notice that the doors are not in order.



	A	B	C	D	E	F
17	2	140.791 sq m	218.33 sq m			
17.1	31/19/90/13 Exterior Wall	140.791 sq m	140.121 sq m			
17.2	13/90/13 Proposed	0 sq m	78.209 sq m			
18						
19	Doors and Windows					
20	Doors					
21	ID Label	Width	Height	Jamb Wi	Jamb Depth	Configuration
22	13	12534	27300	325	1300	
22.1	03	1200	2100	25	100	Swing Bi-part
22.2	04	1200	2100	25	100	Swing Bi-part
22.3	05	1200	2100	25	100	Swing Bi-part
22.4	06	1200	2100	25	100	Swing Bi-part
22.5	07	1200	2100	25	100	Swing Bi-part
22.6	01	762	2100	25	100	Swing Simple
22.7	02	1200	2100	25	100	Swing Bi-part
22.8	12	762	2100	25	100	Swing Simple
22.9	13	762	2100	25	100	Swing Simple
22.10	11	762	2100	25	100	Swing Simple
22.11	10	762	2100	25	100	Swing Simple
22.12	09	762	2100	25	100	Swing Simple
22.13	08	762	2100	25	100	Swing Simple

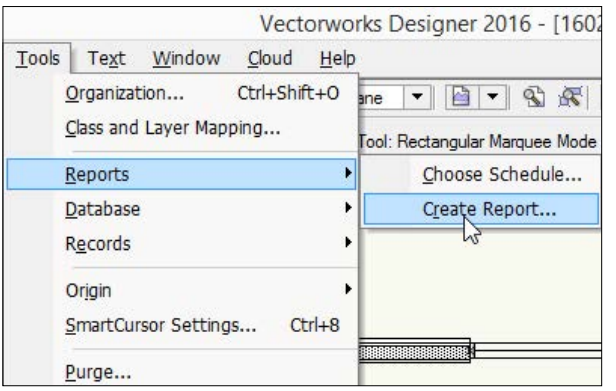
- Select the database row for the doors and use your sorting icons from above column A to sort the doors by number.



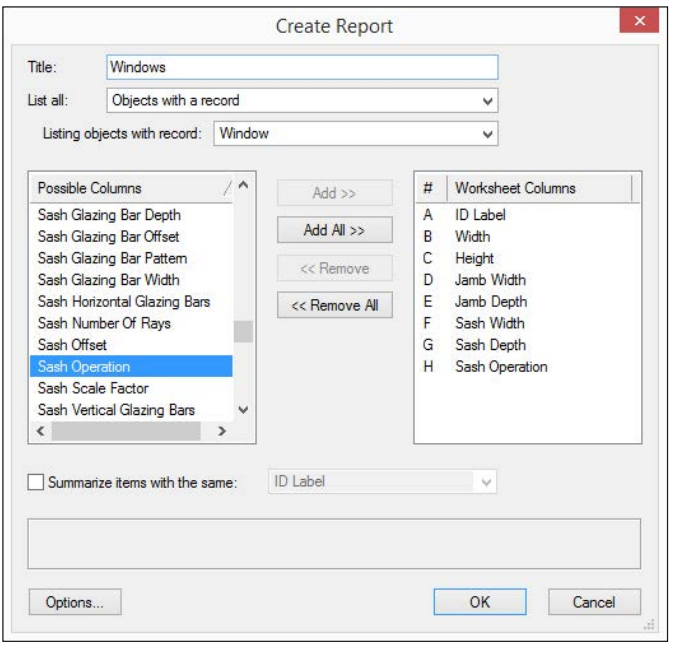
	A	B	C	D	E	F	
17.2	13/90/13 Proposed	0 sq m	78.209 sq m				
18							
19	Doors and Windows						
20	Doors						
21	ID Label	Width	Height	Jamb Width	Jamb Depth	Configuration	Leaf
22	13	12534	27300	325	1300	13	
22.1	01	762	2100	25	100	Swing Simple	Solid
22.2	02	1200	2100	25	100	Swing Bi-part	Glas
22.3	03	1200	2100	25	100	Swing Bi-part	Glas
22.4	04	1200	2100	25	100	Swing Bi-part	Glas
22.5	05	1200	2100	25	100	Swing Bi-part	Glas
22.6	06	1200	2100	25	100	Swing Bi-part	Glas
22.7	07	1200	2100	25	100	Swing Bi-part	Glas
22.8	08	762	2100	25	100	Swing Simple	Solid
22.9	09	762	2100	25	100	Swing Simple	Solid
22.10	10	762	2100	25	100	Swing Simple	Solid
22.11	11	762	2100	25	100	Swing Simple	Solid
22.12	12	762	2100	25	100	Swing Simple	Solid
22.13	13	762	2100	25	100	Swing Simple	Solid
23							

Windows

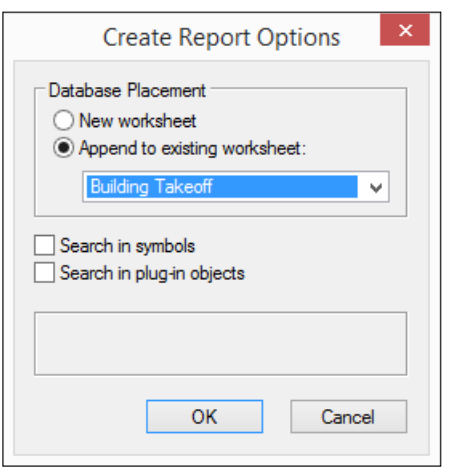
- Reporting the windows is very similar to reporting the doors.
- Go to the Menu bar.
- Choose **Tools > Reports > Create Report…**



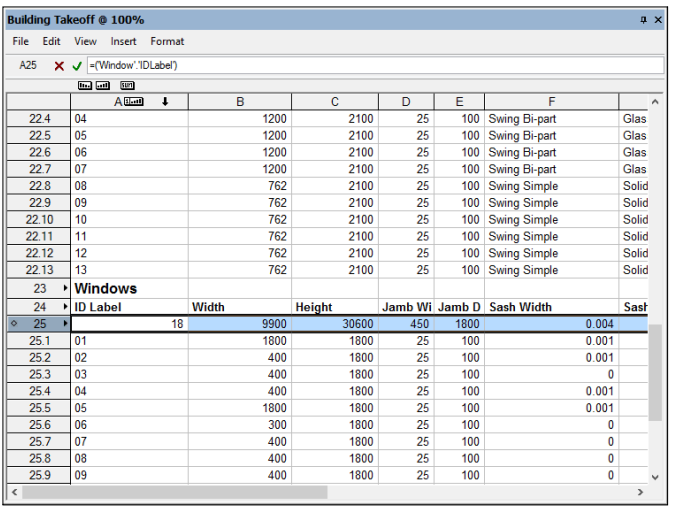
- This command will open a dialog box making it easy to choose the information you want about your doors or windows.
- Give your report a title, in this case of chosen the title **Windows**. We will be appending this report to our main building takeoff worksheet and this title will be added to the worksheet for us.
- Choose the option from the pop-up menu to List all **Objects with a record**.
- From the pop-up menu choose to list objects with the record **Window.** This is similar to the technique that we used for the doors.
- On the left side of the dialog box choose the fields that you want to report.
- Click on the **Add>>** button to add those fields to the right side of the dialog box. These are the fields that will be in your report.



- Click on the **Options...** button.
- Choose to **Append to existing worksheet** and choose your building takeoff worksheet from the pop-up list of possible worksheets in the file.



- Click on the **OK** button.
- Click on the **OK** button once more to return to the worksheet.
- Select the database row for the windows and use your sorting icons from above column A to sort the doors by number.
- In this image you can see all the windows have been reported.

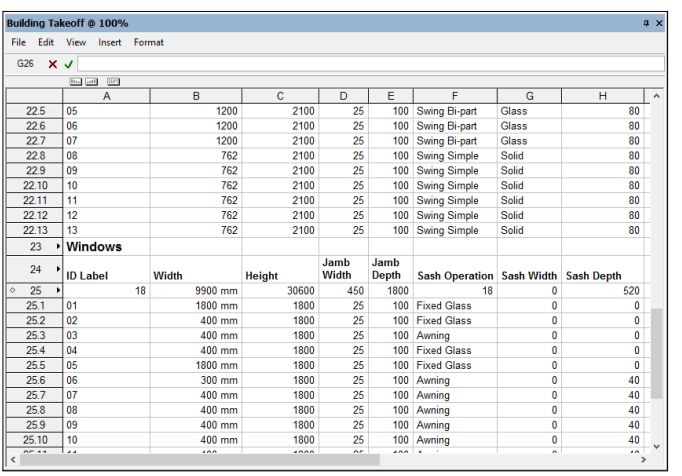

Building Takeoff @ 100%

File Edit View Insert Format

A25 ='Window'.'IDLabel')

	A	B	C	D	E	F	
22.4	04	1200	2100	25	100	Swing Bi-part	Glas
22.5	05	1200	2100	25	100	Swing Bi-part	Glas
22.6	06	1200	2100	25	100	Swing Bi-part	Glas
22.7	07	1200	2100	25	100	Swing Bi-part	Glas
22.8	08	762	2100	25	100	Swing Simple	Solid
22.9	09	762	2100	25	100	Swing Simple	Solid
22.10	10	762	2100	25	100	Swing Simple	Solid
22.11	11	762	2100	25	100	Swing Simple	Solid
22.12	12	762	2100	25	100	Swing Simple	Solid
22.13	13	762	2100	25	100	Swing Simple	Solid
23	**Windows**						
24	**ID Label**	**Width**	**Height**	**Jamb Wi**	**Jamb D**	**Sash Width**	**Sash**
25	18	9900	30600	450	1800	0.004	
25.1	01	1800	1800	25	100	0.001	
25.2	02	400	1800	25	100	0.001	
25.3	03	400	1800	25	100	0	
25.4	04	400	1800	25	100	0.001	
25.5	05	1800	1800	25	100	0.001	
25.6	06	300	1800	25	100	0	
25.7	07	400	1800	25	100	0	
25.8	08	400	1800	25	100	0	
25.9	09	400	1800	25	100	0	

- As well as using these worksheets to report the information about doors and windows, you can also use them to edit the information about the doors and windows. For example, this worksheet will easily change sash operation for selected windows from awning to fixed glass or any other operation.
- This worksheet can also be used to change the width, height, or elevation of the windows.


Building Takeoff @ 100%

File Edit View Insert Format

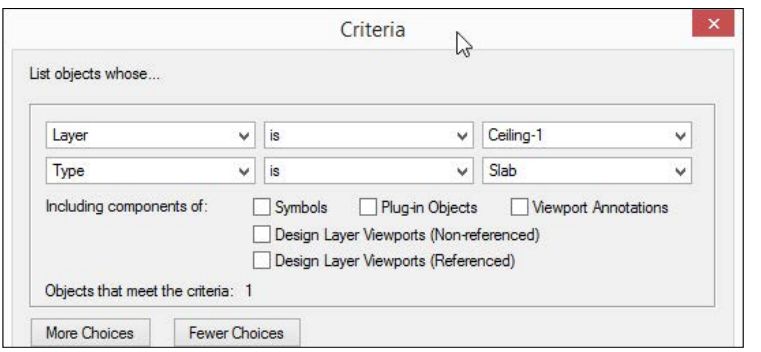
G26

	A	B	C	D	E	F	G	H
22.5	05	1200	2100	25	100	Swing Bi-part	Glass	80
22.6	06	1200	2100	25	100	Swing Bi-part	Glass	80
22.7	07	1200	2100	25	100	Swing Bi-part	Glass	80
22.8	08	762	2100	25	100	Swing Simple	Solid	80
22.9	09	762	2100	25	100	Swing Simple	Solid	80
22.10	10	762	2100	25	100	Swing Simple	Solid	80
22.11	11	762	2100	25	100	Swing Simple	Solid	80
22.12	12	762	2100	25	100	Swing Simple	Solid	80
22.13	13	762	2100	25	100	Swing Simple	Solid	80
23	**Windows**							
24	**ID Label**	**Width**	**Height**	**Jamb Width**	**Jamb Depth**	**Sash Operation**	**Sash Width**	**Sash Depth**
25	18	9900 mm	30600	450	1800	18	0	520
25.1	01	1800 mm	1800	25	100	Fixed Glass	0	0
25.2	02	400 mm	1800	25	100	Fixed Glass	0	0
25.3	03	400 mm	1800	25	100	Awning	0	0
25.4	04	400 mm	1800	25	100	Fixed Glass	0	0
25.5	05	1800 mm	1800	25	100	Fixed Glass	0	0
25.6	06	300 mm	1800	25	100	Awning	0	40
25.7	07	400 mm	1800	25	100	Awning	0	40
25.8	08	400 mm	1800	25	100	Awning	0	40
25.9	09	400 mm	1800	25	100	Awning	0	40
25.10	10	400 mm	1800	25	100	Awning	0	40

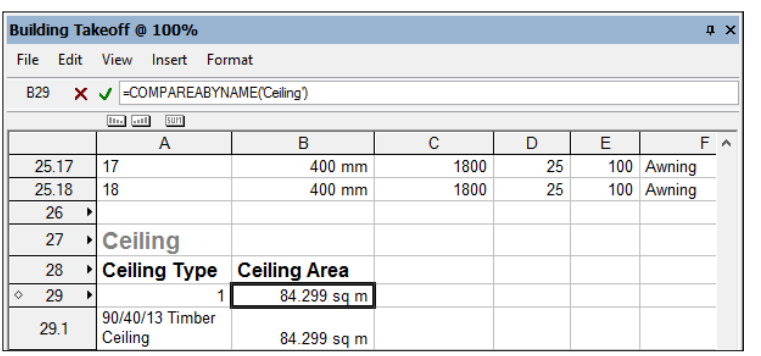
Ceilings

The ceilings should be created from a slab, which means you can use the same technique we used for the floor finishes to calculate the areas of the ceiling.

- Set up a database to look for your slab objects on the ceiling layer.



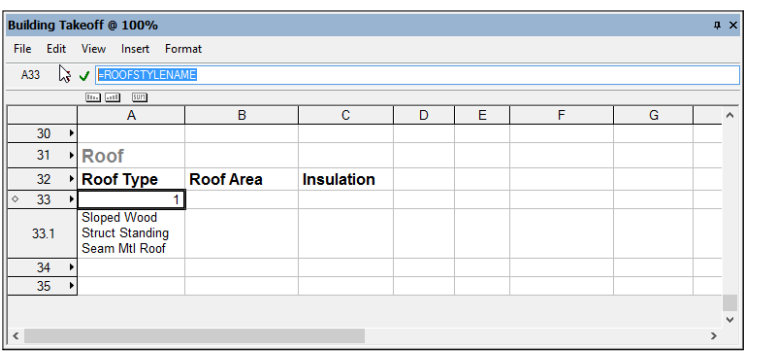
- Use the function to calculate the component area by name. The name might relate to the ceiling area, the ceiling joists, or the area of insulation. You can also use the same calculation to calculate all three.



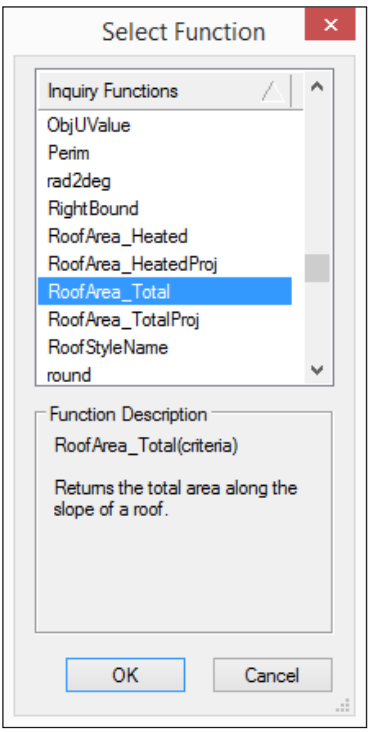
Roofs

Calculating the area of roofs has a slight variation on the techniques we have used so far. Don't forget that the roof is on a sloping surface.

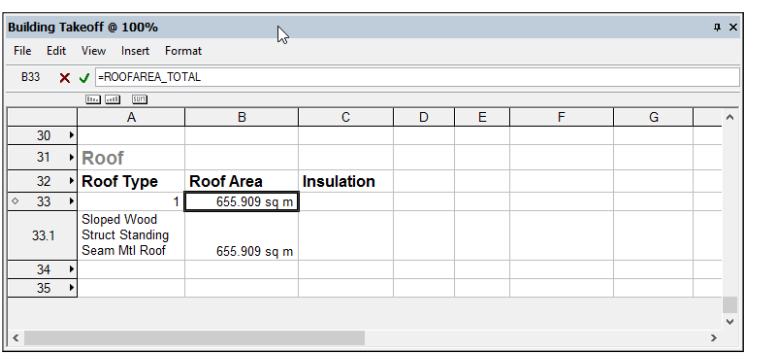
- Set up a database to look for roof objects on the roof layer. You can look for objects by their type (Roof) or you could look for objects by their class (Structural-Roof).
- If you look for objects by the type and you choose to look for Roof objects you will not find Roof Face objects. If you never use roof bases then this will not be a problem. However, you might think that you will never use a roof face object, but then you need to use one in a project, and then your report will miss it out.
- If you look for objects by their class and you are consistent with the class names you give to roofs and roof faces, then your report will always work and it will never leave any objects out.



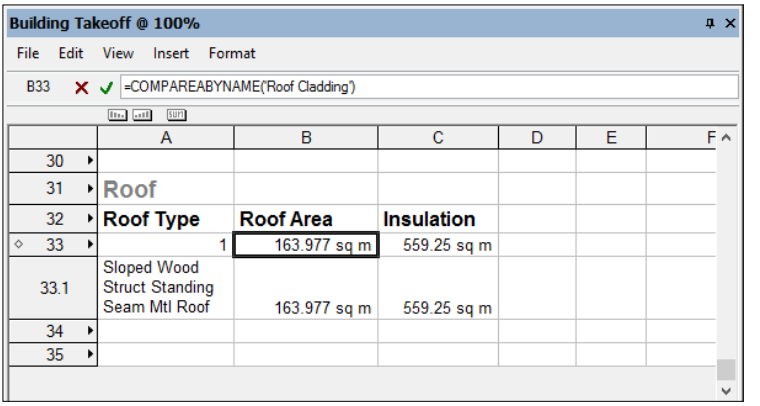
- When you look at the functions for reporting the roof area, you might be tempted to use this function RoofAreaTotal.
- If you look at the description of this function, it says that it will report the total area of the roof along the slope, which sounds ideal.



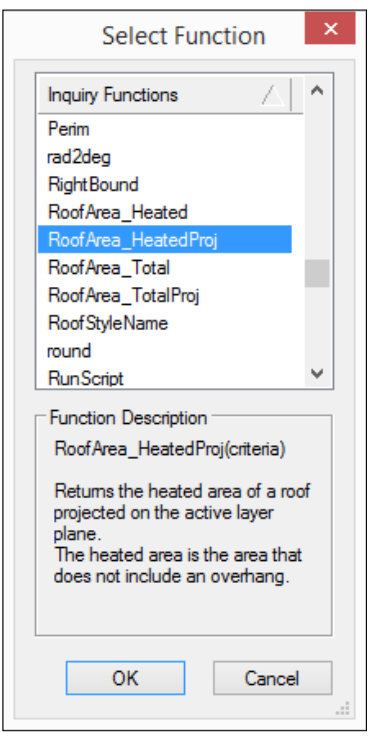
- The challenge is that this function will do exactly as it says and report the total area along the slope of the roof. Because this roof contains more than one component Vectorworks is reporting four times as much roof area as there should be.



- A better solution would be to report the component area by name and choose the roof cladding component. If you have created any offsets to your roof cladding component, these will be included in the calculation.



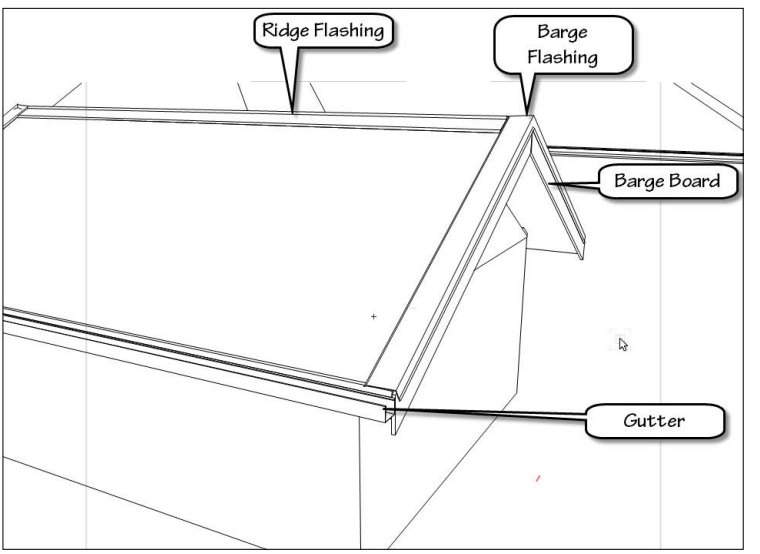
- The area of the insulation depends on the construction of the roof. If the insulation is the flat area of the ceiling, then you could use the function that finds the heated area of the roof projected down onto a plane.



Roof Accessories

There are many different roof accessories that you may need to report. Vectorworks does not build these objects automatically, so you will have to build them using a combination of framing members, extrusions, or extrude along the path.

These objects can be counted, but you will have to make sure that you are consistent about the classes and techniques that you use to create these objects.



Conclusion

If you want to create a highly accurate building takeoff then you have to design the report that you want first, then you have to make sure that when you create your objects (such as walls, roofs, ceilings, doors, windows, et cetera) they will be consistently created to feed into the report.

In the file that I have used for this manual, I have been consistent about the naming conventions I have used for wall components, for classes, and for slabs. This has made it easy for me to create my report.

While I was writing the notes I had to go back to some of my wall styles and update the names of components to make them consistent, and you will probably have to do the same. Your first project will require the worksheet to talk to the objects and the objects to feed into the worksheet, so prepare yourself for some editing of your objects to make sure that they feed into the worksheet correctly.

This may seem like a lot of work. On the other hand, once you've done all that work, you now have a template that you can use for any project. Any project that you start from this template will have the correct components, the correct classes, the correct layers, et cetera. So while this seems like a lot of work what you have built is an office system that you can use on project after project.

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