TRAINING COURSEWARE (ESSENTIALS)

KURSUS PERISIAN COST-X

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Contents

Introduction

This document in conjunction with the Introduction to CostX® manual, aims to inform and demonstrate the principles of measurement using CostX® and how basic elemental cost plans can be produced. The exercises are based around the use of example files and templates which have been developed for demonstration and training purposes only. Actual implementation of the software and templates will depend on users own resources and specific reporting requirements.

Save the Associated Dataset files to a location on your computer or network that may be accessed during the training exercise and work through each module sequentially. Complete all sections before moving on as each subsequent module relies on data established in previous exercises.

Throughout this document you will see **(PFC 5-1)** references. These identify the relevant Process Flow Charts related to that particular section of the training, copies of which can be found on the www.exactal.com website.

At its core, CostX® comprises two complementary and fully integrated modules (**PFC 1-2)**:

- The Dimension View where drawing files can be viewed and, without the use of CAD software or any previous experience of CAD, detailed and accurate dimensions can be quickly taken from 2D images, PDF or CAD drawings, or generated automatically from 3D CAD models.

- The Costing View: a spread sheet based workbook within which cost plans, estimates and schedules of quantities etc.; are developed. It is possible to import previous documents to use as a template, access rate libraries, enter codes for sorting and generate reports.

Refer to the CostX® help files by pressing the F1 key, or by clicking the Help icon in the top right hand corner of the screen for a full explanation on how to use and implement functions. Alternatively refer to the Introduction to CostX® manual for quick references.

Formatting Conventions Used

Following are the formatting conventions used throughout this training exercise.

Bold Font	Direction for User
[Bold Font]	Anything fixed in CostX® for example button name, right click options, field names, etc.
{ Bold Font }	Anything which a user can change, for example drawing name, dimension group name, model map name, workbook name.
"**Bold Font**"	Anything a user has to enter, for example building name, workbook name, dimension group name.

Module 1: Getting Started

In Module 1 you will learn how to open CostX®, create a new Project and create a new Building associated with that Project, add and prepare a variety of common two dimensional drawing file formats for measurement (by scaling or calibration), and compare one drawing with another.

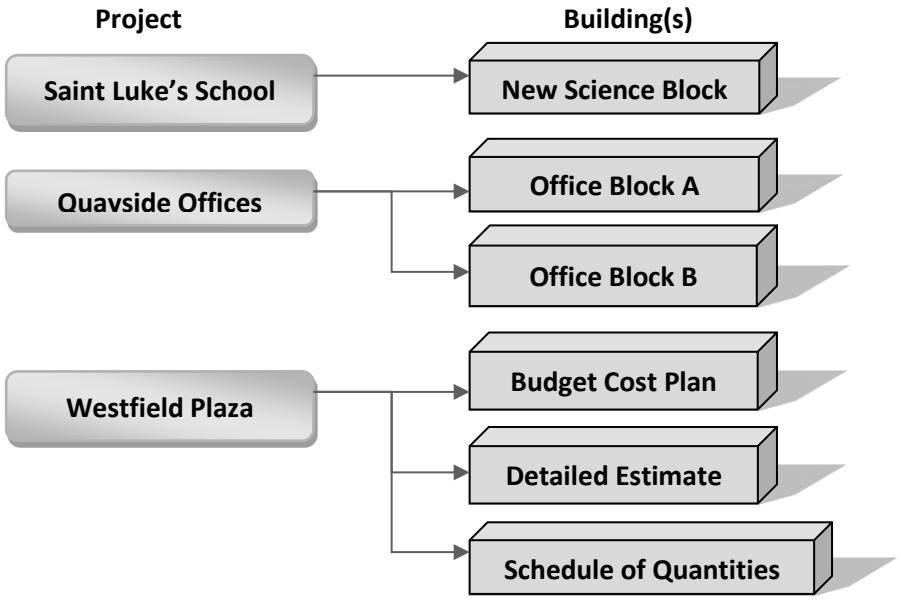
Opening CostX (PFC 1-1)

1.1. When CostX® is installed an icon is placed on the **[Desktop]** of the computer. **Double click** on this **[icon]** to open CostX®. Alternatively, **click** on the **[Start button]** at the bottom left of the screen, then click on **[All Programs > Exactal > CostX®]**. If prompted, enter your user name and password then click OK.

CostX® will open with the Select Building window active on screen. This allows the user to select an existing Building to open, either from a list of the most Recent Buildings worked with, or from a list of All Buildings in the database. There are also buttons to add a new Building to an existing Project, or to create a new Project.

Creating a New Project (PFC 1-3)

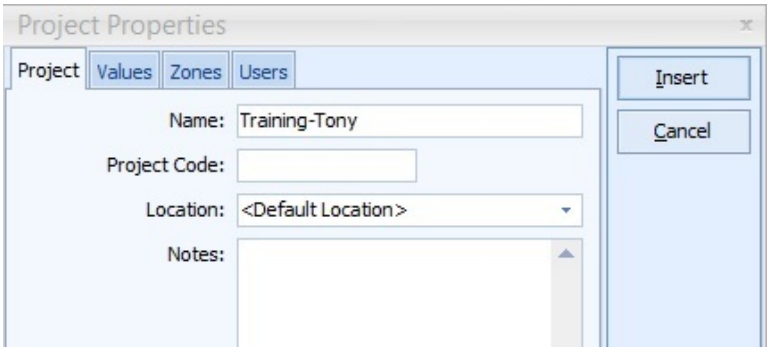
This section explains how to create a new project. CostX® utilises a two level hierarchy of Projects and Buildings. Once a Project has been established, all CostX® activities take place within a Building file. A Project can contain any number of Building files which may be used to differentiate various components of the Project, to separate the work into different cost centres, or to break the work up into specific stages. Therefore, to start a new Cost Plan, Estimate or Schedule in CostX® you must first create a Project file for the Building files to be saved in.



1.2. **Click** on the **[New Project]** button at the right of the **[Select Building]** window. An empty **[Project Properties]** window will open.

1.3. **Enter** a **[Name:]** for your Project of "**Training-" followed by your name**.

1.4. Use the drop-down menu in the **[Location:]** field to select **<Default Location>** then **click [Insert]**. Your new Project has now been created.



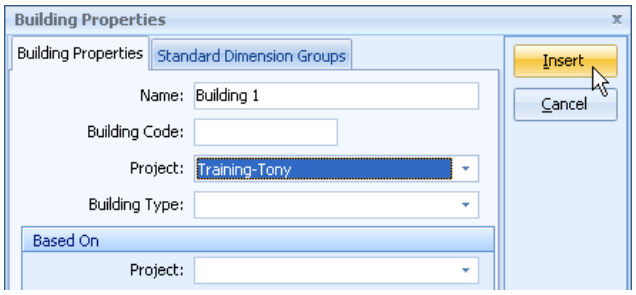
Creating a New Building (PFC 1-4)

Once a Project has been created, a Building can be added to that Project to enable you to start work.

1.5. **Click** on the **[New Building]** button at the right of the **[Select Building]** window.

1.6. In the **[Building Properties]** window, in the **[Name:]** field enter "**Building 1"**.

1.7. In the **[Project:]** field use the drop-down menu to select the '**Training-Your Name**' project that was recently created.

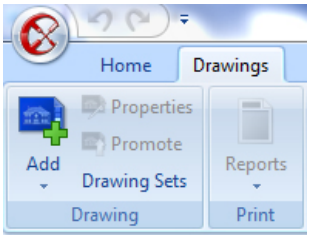


1.8. Ignore the Based On section for now and **click [Insert]**. This will create a new Building called 'Building 1' and attach it to the Project called 'Training-Your Name'. The CostX® display will open in the Dimension View ready for you to add drawings.

Adding and Calibrating Drawings (PFC 2-1)

There are several types/formats of drawings which can be added in CostX®. Once a Building has been created, the drawings can be added. In this exercise we will add three different types of drawings. For more information refer to the CostX® Advanced Manual Section 2.

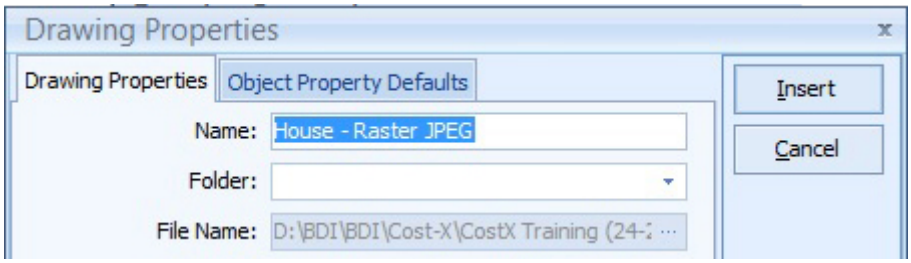
Raster Drawings



1.9. **Click** on the **[Drawings]** ribbon at the top of the screen ❶ (see right) to open the drawings ribbon menu. **Click** on the **[Add]** button❷. If the drop-down menu appears select Add Drawing.

1.10. Browse for the training data set and **select** the **{ House – Raster JPEG.jpeg }** file. **Click [Open]** button.

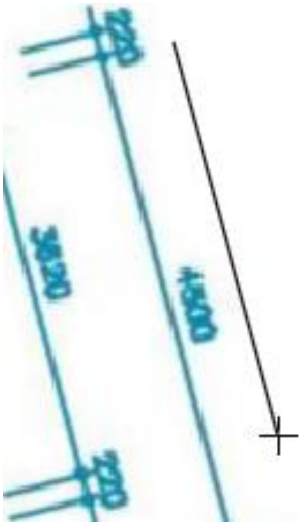
1.11. In the **[Drawing Properties]** window, **enter** "**Plan Views/Raster**" in the **[Folder:]** field. Do not amend anything else (leave the scale at 1:1) and **click [Insert]** button to add the drawing.



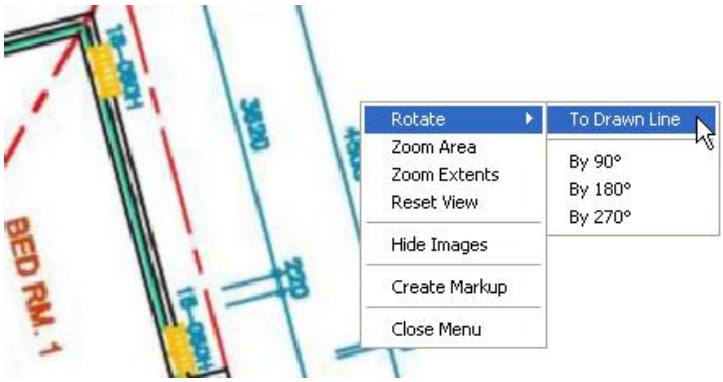
Rolling the mouse wheel forward and back zooms in and out of the drawing, whilst holding down the mouse wheel and dragging the cursor moves (pans) the drawing around.

After adding a drawing, the drawing can be rotated, calibrated or scaled as given in this section.

1.12. To rotate the drawing, **move the cursor to the top right of the drawing** and roll the mouse wheel forward to **zoom in**.



1.13. **Click** the **right mouse button** and hover over **Rotate** to open the sub-menu then **click** on **To Drawn Line**. The cursor will change to a cross-hair.

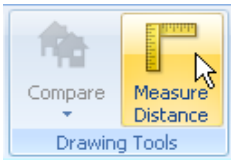


1.14. **Choose a line on the drawing** to use as a basis for establishing a new horizontal orientation.

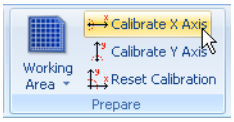
1.15. **Position the cursor** cross-hair on or near **to one end** of this line and **click once**. **Drag the cursor** to draw a line parallel to it then **click again** and the drawing will snap (rotate) to the chosen orientation.

If you cannot see the orientation line as you draw it may be white. Click the 'White' background button, and then recommence the Rotate to Drawn Line process for the line to show in black.

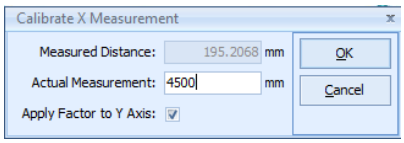
1.16. **Click** the **[Measure Distance]** button in the ribbon (or press the M key) then **click once at one end of a known dimension**. Move the cursor across the dimension to **check the drawing scale**. In this example, the drawing is not at 1:1 and the scale therefore needs to be identified and the drawing properties amended to reflect the correct scale.



1.17. **Click** the **[Measure Distance]** button again (or press the M key) to turn off this feature then **click** on the **[Calibrate X Axis]** button to open calibration mode.

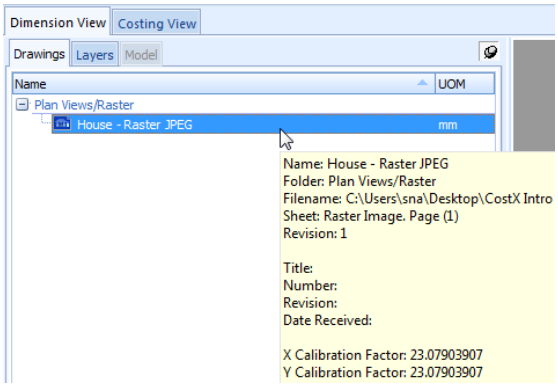


1.18. **Position the cursor** cross-hairs **at one end of** a known or figured horizontal dimension **line**. **Click once** then **position the curser** cross-hairs at the other end of the dimension line and **click again**. The **[Calibrate X Measurement]** window] will open.



1.19. **Overwrite** the figure in the **[Actual Measurement:]** field with the known dimension using the stated Base UOM: (Unit of Measurement), in this case **4500mm**, then **click [OK]** button.

1.20. CostX® will automatically calculate the X-axis scale and will also apply it to the Y-axis. To see the scale (calibration factor), **move the cursor over the drawing title** to open an information box. In this instance the scale is an irregular figure because the drawing is an image file.



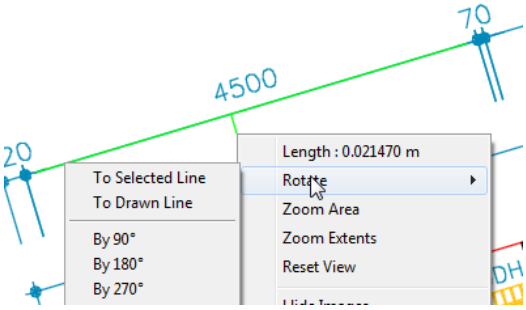
1.21. **Click** the [**Measure Distance]** button (or press the M key) and **verify** the drawing **calibration factor**.

PDF Drawings

1.22. Now **add** the drawing **{ House – Vector PDF.pdf }**. In the **[Drawing Properties]** window, **enter** "**Plan Views/Vector**" in the **[Folder:]** field. Do not amend anything else (leave the scale at 1:1) and **click [Insert]** button to add the drawing.

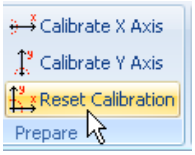
> *Note that on this drawing, lines will highlight in green as the cursor is moved over them and the green highlighting connects to the cursor. This is called the 'Sticky Cursor'.*

1.23. To re-orientate this drawing, **choose a line** to use as a basis for establishing a new horizontal orientation then **move the cursor over it** so it highlights in green. **Click** the **right mouse button**, hover over **Rotate** and **click** on **To Selected Line**. The drawing will snap (rotate) to the chosen orientation.



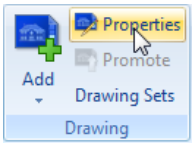
1.24. **Check the scale**, note that on a vector file such as this pdf, Measure Distance allows you to snap to points; the snap feature can be deactivated by holding down the B Key (alternatively using the Snap button in the Dimensions ribbon). The drawing will need to be calibrated.

1.25. **Calibrate**, and note that with this drawing the calibration returns a value of (or very close to) 1:200. Therefore rather than leaving the scale as calibrated, the actual scale of 1:200 can be entered as follows.



1.26. **Click** the **[Reset Calibration]** button to zero the calibrated factor.

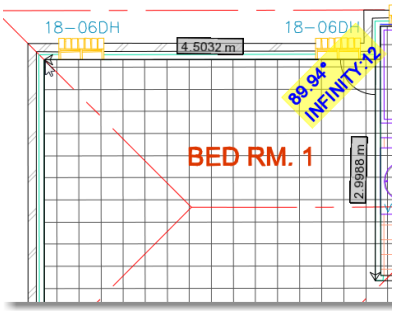
1.27. Open the Drawing Properties window by either **double clicking** on the **drawing title**, or by clicking on the Properties button on the Drawings ribbon menu.



1.28. In the Drawing Properties, amend the **[Horizontal Scale:]** and **[Vertical Scale:]** to **1:200** and **click [Update]** button.

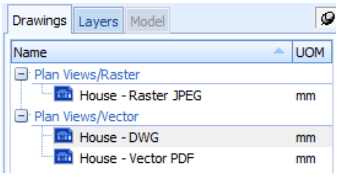
1.29. **Verify the scale** using the **[Measure Distance]** button or the M key.

1.30. You can **use Measure Distance** for continuous segments while **holding down the Ctrl key**, this function will allow you to display distances between segments as well as the angle between measured segments.

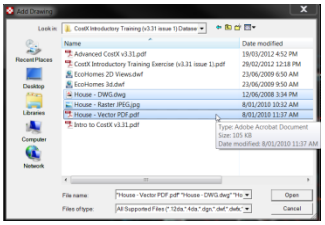


DWG Drawings

1.31. Now **add** the CAD drawing { **House - DWG.dwg** }. In the **[Drawing Properties]** window, **select or enter "Plan Views/Vector".** Leave the scale at 1:1 and click **[Insert].** Note that the drawing is automatically orientated. Check the scale and note that it is correct at 1:1 which is a CAD standard.



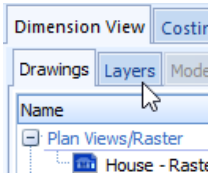
You should now have three different file types of the same drawing loaded into CostX® – a raster image, a vector PDF and a DWG file. These are the most common file types that you are likely to encounter.



The Add Drawing Button can also be used to add multiple drawings simultaneously. Once the Add Drawing button is selected, multiple drawings in the File Open Dialog Box may be selected using the CTRL key to select multiple individual drawings or the Shift key to select groups of drawings

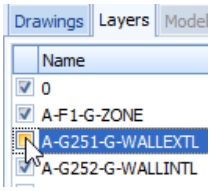
Working with Layers (PFC 2-2)

CAD, and some vector PDF, drawings are drafted using multiple layers of information. CostX® gives the user the ability to hide unwanted layers from view. This removes clutter from the drawing and allows the user to show only those layers which are relevant to the required measurement. It also simplifies the measurement process by avoiding the sticky cursor sometimes being attracted to the wrong lines.



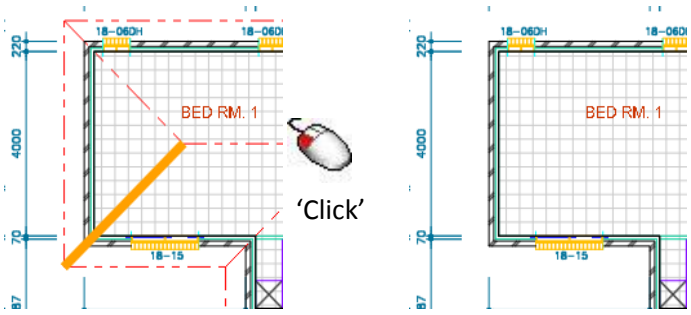
1.32. **Click** on the **{ House – DWG }** drawing title to open it.

1.33. **Click** on the **[Layers]** tab above the list of drawings. The list will change to show the drawing's layers.

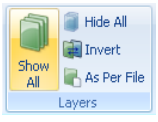


Each layer may be switched on or off by using the tick boxes adjacent to the name, however, the name often does not enable its content to be readily identified, so the easier method is as follows.

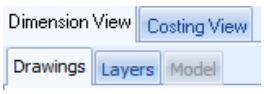
1.34. Ensuring that you still have the Layers tab open, **hover the cursor over the drawing lines** and items will highlight orange. **Clicking the highlighted object** will remove this layer from view. Holding the **[Shift]** key will highlight all associated objects in the layer.



1.35. To reinstate all of the layers **click** the **[Show All]** button on the Drawings ribbon menu.

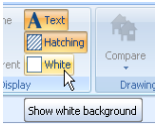


1.36. **Click** the **[Drawings]** button above the list of layers to revert back to measurement mode. You cannot measure whilst the Layers tab is open.



Layers are always available on DWG drawings but with vector PDF drawings are dependent upon the settings used by the designer when exporting the PDF from the CAD program. Hence you may receive vector PDF drawings either with or without layers. As the designer is able to control the settings to include layers, always try to obtain drawings with layers as there are significant advantages. Image files such as raster PDF or JPEG files do not have layers.

Another useful feature is the ability to switch the background from black to white, and vice versa. To do this click on the Show White Background button.

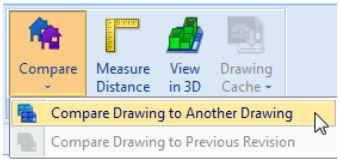


Drawing Comparison (PFC 2-3)

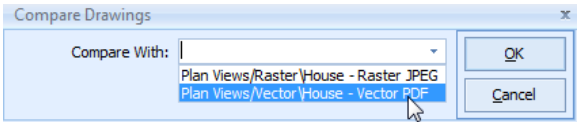
CostX® affords the user the ability to compare one drawing with another or, if further revisions of the same drawing have been added, to compare a current drawing with an earlier iteration.

1.37. Ensure that the **{ House – DWG }** drawing is open.

1.38. **Click** the **[Compare]** button on the Drawings ribbon menu and then **click [Compare Drawing to Another Drawing]**.



1.39. **Open** the drop-down menu in the [**Compare With:**] field and **select** the **{ Plan View/Vector\House – Vector PDF }** drawing before clicking OK.

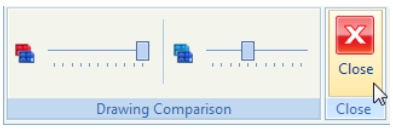


The screen will show two images, one red and one green, overlaying each other. The red is the House – DWG drawing that was open initially, and the green is the House – Vector PDF drawing that was selected for comparison.

1.40. Use the mouse scroll wheel to **zoom in** or out accordingly then use the following functions to **reposition the green image** to overlay the red one below.

Holding down the left mouse button and dragging the cursor moves the green image. The intensity of the two images can be altered by adjusting the position of the sliding controls in the ribbon menu. Having reviewed the differences between the selected drawings

1.41. **Click** the **[Close]** button to return to the Dimension



Module 2: Introduction to Measuring and Workbook

In CostX®, Dimensions are measured from drawings and placed into Dimension Groups, which are themselves collected together in Dimension Group Folders. Once established, Dimension Groups can be held in templates or libraries ready for use on future jobs, with new Dimension Groups being created as needed. In Module 2, we shall add Dimension Groups and use various techniques applicable to the differing drawing types to measure areas lengths and counts. We shall then create a new workbook containing live-links to these Dimension Groups, learn how to use multiple Dimension Groups to build-up quantities, and build-up rates.

Measuring – Point Mode (Raster)

- ***Areas*** - click once on a corner of the area to be measured then move the mouse to the next corner and click again. Continue to click the cursor at each corner to enclose the area then at the last corner, before returning to the start, press enter.
- ***Lengths*** – click on the end of a length to be measured. Hold the Ctrl key and move the mouse to the end of the length then click to capture it. Keep holding the Ctrl key to add further lengths to the first, or release the Ctrl key to start a new length.
- ***Counts*** – click on the item to register a count.

Measuring Areas – Line Mode (Vector)

- ***Standard*** – click on perimeter of area to define its borders, click once at every change of direction and press enter or right click to complete the area.
- ***Quickpoint*** – press and hold the Shift key to measure a rectangular area.
- ***Quickpoint Combining Areas*** (for irregular-shaped area) – press and hold Shift key to measure area 1, press and hold Control key (do not release Shift key) and click to measure adjacent area(s) – the areas will be combined.
- ***Polyline*** – press and hold L key whilst holding the cursor over the perimeter of an area. If a polyline is available, the area will be highlighted blue. Click once to capture the area.

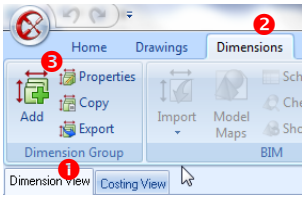
Measuring Lengths – Line Mode (Vector)

- ***Standard*** – click on lines to measure the length of the item.
- ***Combining Lengths*** - press and hold Control key to measure the length of combined items, click once at every change of direction.
- ***Trimming Lengths*** –use of the right mouse menu to *trim start/end* at intersections of lengths measured using *Combining Lengths.*
- ***Polyline*** – press and hold L key whilst holding cursor over a line. If a polyline is available, the full perimeter of an area will be captured with a single click.

Measuring Counts – Line Mode (Vector)

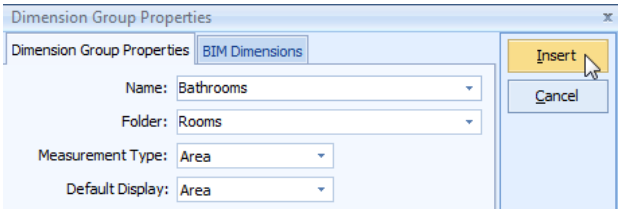
- ***Standard*** – click on the item to register a count.
- ***Blocks*** – press and hold Shift key to highlight the item as a drawing block (object – usually but not always doors, sanitary fixtures, etc.) then click.
- ***Multiple Counts*** – press and hold Shift and Control keys, then click to count all like *Blocks*.

Adding Dimension Groups (PFC 2-4)



2.1. To add a Dimension Group first ensure that the Dimension View is open❶. **Click** on the **[Dimensions]** ribbon ❷ at the top of the screen to open the ribbon menu then click the **[Add]** button❸.

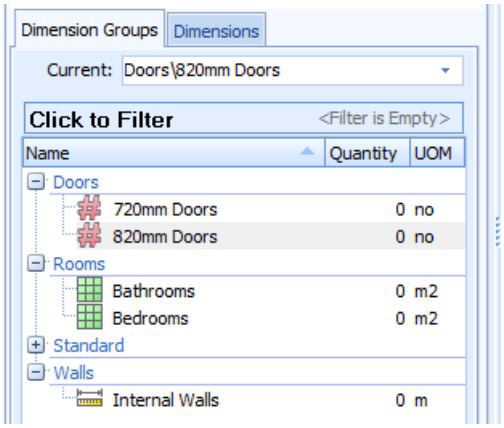
2.2. In the **[Dimension Group Properties]** window **enter** a **[Name:]** of "**Bathrooms**" and a **[Folder:]** of "**Rooms**". **Select** a **[Measurement Type:]** and **[Default Display:]** of **Area** from the drop-down menu then **click [Insert]**.



2.3. Repeat this process to **create** another **Dimension Group** named **{ Bedrooms }** in the same Rooms folder, again with a **[Measurement Type]** and **[Default Display:]** of **Area**.

2.4. **Create** another **Dimension Group** named **{ Internal Walls }** in a **folder** called **{ Walls }**, with a **[Measurement Type]** and **[Default Display:]** of **Length**.

2.5. **Create** two further **Dimension Groups** called **{ 720mm Doors }**, and **{ 820mm Doors }**, in a **folder** called **{ Doors }** with a **[Measurement Type]** and **[Default Display:]** of **Count**.



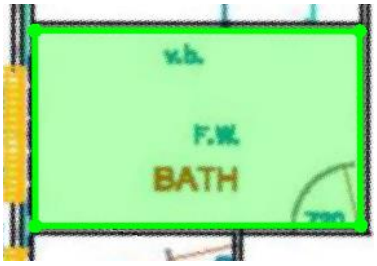
Measuring Areas (PFC 2-5)

From Raster JPEG Drawing

2.6. **Click** on the **{ House – Raster JPEG** } drawing name to open the drawing. **Click** on the **{ Bathrooms }** dimension group to highlight it.

2.7. **Move the mouse over the drawing** and roll the mouse wheel forward to **zoom into the bathroom**.

2.8. **Place** the mouse **cursor** over a **corner of the room** and **click** to commence measurement. A green dot will appear. **Release** the **mouse click** and **move** to the **adjacent corner** of the room then **click again**. A green line will follow the cursor. **Click** on the **next corner**, and then the fourth corner to enclose three sides of the room area. **Press Enter** and the area will automatically complete, the area measured will be highlighted and the quantity will appear in the Bathrooms dimension group.



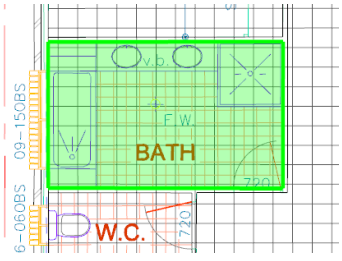
Note that once the area has been completed, the enclosing lines may be moved (hover cursor over the line, hold left click and drag) or the location of the click points may be adjusted (hover cursor over the click point, hold left click and drag). By use of these features, areas may be measured quickly, and then "cleaned up" afterwards. The drawing title will now be highlighted in bold, denoting that measurements in the selected dimension group have been taken from it.

From Vector PDF Drawing

2.9. Now **click** on the **{ House – Vector PDF }** drawing name to open that drawing

2.10. **Zoom** into the **bathroom**. Ensure that the Bathrooms dimension group remains selected.

2.11. To measure the area on a vector drawing **attach** the **sticky cursor to** the inside face of one of the **walls** and **click**. A part or all of the length of the wall will be highlighted. Attach the sticky cursor to a part of the next adjoining wall and click. **Repeat for the remaining walls** then **press Enter** from keyboard to complete the area.



Note that you do not need to highlight the entire length of each wall and that if you accidentally click on the wrong line, pressing the Ctrl and Z keys together will undo the last click.

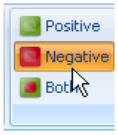
From DWG Drawing

2.12. Next **open** the **{ House – DWG }** drawing and **zoom into** the **bathroom**.

2.13. Ensure that the Bathrooms dimension group is still selected. **Attach** the **sticky cursor to** the inside face of one of the **walls** but before clicking **hold down** the **L key** on the keyboard. The room area will be shaded in blue. Whilst it is, **click left mouse button** to capture the area. The dimension group quantity should now be around 24m² and all of the drawing titles will be bold

> *Alternatively, the room area could have been measured in the same manner as the Vector PDF.*

Negative Area Measurements



2.14. It is possible to measure negative areas or deductions in CostX®. **Click** on the **[Negative]** button on the **[Dimensions]** ribbon to show and measure only negative dimensions. **Move the cursor over the drawing** and note that lines now highlight in red.

2.15. **Attach** the **cursor to** the **outside face of** the bathroom **shower** cubicle and **hold down** the **L key** to highlight it all. **Click** the **left mouse button** to capture the area, which will shade red, and reduce the dimension group quantity by 1m².

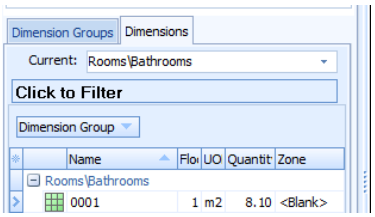
2.16. **Click** on the **[Both]** button on the **[Dimensions]** ribbon to show all dimensions. The Bathroom area will be highlighted green with the shower cubicle area highlighted red denoting positive and negative measurements.

2.17. **Move the cursor over the shower cubicle** so that it highlights blue, **click the right mouse button** and then **click** on **[Delete dimension]** from the menu to clear the deduction.

Current Drawing Filter

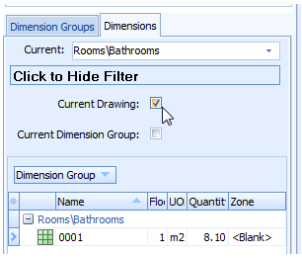
2.18. **Click** on the **[Bedrooms]** dimension group.

2.19. Whilst still in the **{ House – DWG }** drawing zoom into and **attach the sticky cursor to** the inside face of a **wall in Bedroom 1**. **Hold the L key** to highlight the bedroom, you may need to try a few wall locations to highlight the required area, then **click the left mouse button** to measure it.

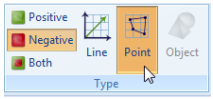


2.20. Next **click** on the **[Dimensions]** tab to show a list of all individual measurements taken for the selected Dimension Group. By default, the list includes Dimensions measured from the current drawing.

2.21. **Click** the **[Click to Filter]** button on the Dimensions Module and **uncheck [Current Drawing]** option to turn this filter off and show all Dimensions for the selected Dimension Group taken from all drawings.

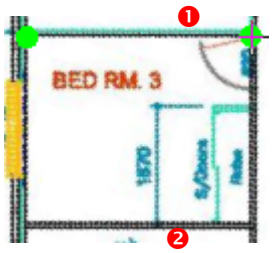


2.22. **Open** each of the **other drawings** and **measure Bedroom 1** using the same methods as before. Note how each individual Dimension is added to the list. **Check** the **[Current Drawing]** option on the Dimensions module menu to turn the filter back on.



A useful feature on Vector PDF and CAD drawings is the option to switch from Vector to Raster Mode using the buttons on the Dimensions ribbon. The cursor will now snap from point to point allowing swift selection of points instead of vector lines. Furthermore, to measure completely Free Hand deselect the button Snap, whilst still in Raster Mode (or hold down the B key to disable Snap temporarily). Now measure Bedroom 3 from the House DWG drawing using this Raster Mode measure.

Measuring Lengths (PFC 2-7)



2.23. **Click** on the **{ Internal Walls }** dimension group.

From Raster JPEG Drawing

2.24. **Open** the **{ House – Raster JPEG }** drawing and **measure Bedroom 3 partition wall** ❶ (see right) as follows.

2.25. **Click** and release the **left mouse button at one end** of the wall. A green dot will appear with a connecting line. **Move the cursor to the other end** of the wall and left mouse **click again**. This highlights a line between the dots, combining them into a length.

2.26. **Repeat** the above **process** to measure the second partition wall ❷ to Bedroom 3.

After the length is taken, each length segment or click point can be relocated in the same manner as with area measurements.

2.27. Next, **measure** the **corridor partition wall** as follows.

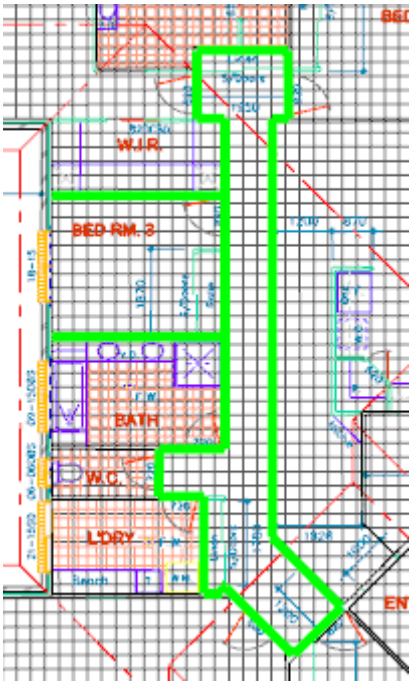
2.28. **Click and release the mouse on a corner** start point which will highlight in green. Now **left click at the next corner**, as above **hold down the Ctrl key** and **move** the cursor to the **next corner**. The cursor will drag a highlight line along with it. **Continue to click and release** on each change in direction of the wall.

Note that you may release the Ctrl key at any time to zoom or pan around the drawing.

From Vector PDF Drawing

2.29. **Open** the **{ House – Vector PDF }** drawing.

2.30. **Measure the Bedroom 3** walls by **attaching the sticky cursor** to each one and **clicking**.



> *You will need to zoom in to select the specific lines to attach to. If you accidentally measure the wrong line, either press the Ctrl and Z keys together to undo the last measurement, as before, or hover over the incorrectly measured green line so that it outlines in blue then click the right mouse button. A menu will open giving you the option to delete just the highlighted length (Delete Dimension), or delete all measurements and start again (Clear All Dimensions).*

2.31. Next, **measure the corridor partition** by clicking on one length of wall. Hold the Ctrl key down and **move the cursor** over the next adjoining wall. **Clicking each adjoining wall** in turn whilst **holding the Ctrl key** combines each length into one measurement spanning openings and steering around changes in direction.

> *Note that you do not have to highlight the entire length of wall when Combining Lengths as CostX® will determine the intersection between changes of direction and fill in the gaps.*

From DWG Drawing

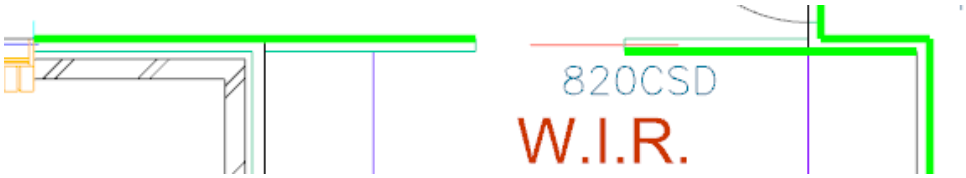
2.32. **Open** the **{ House – DWG }** drawing and **open** the **[Layers]** tab. Remove unnecessary layers to isolate the walls. Then **measure** the **Bedroom 3 walls**, and then the **corridor walls** using the *Combining Lengths* method.

2.33. Next, select and delete the corridor dimension. Then attach the sticky cursor to a section of the corridor wall and without clicking, hold down the L key. When the entire corridor wall highlights in blue, click to capture the length using the *Polyline* method.

Trimming Unwanted Lengths

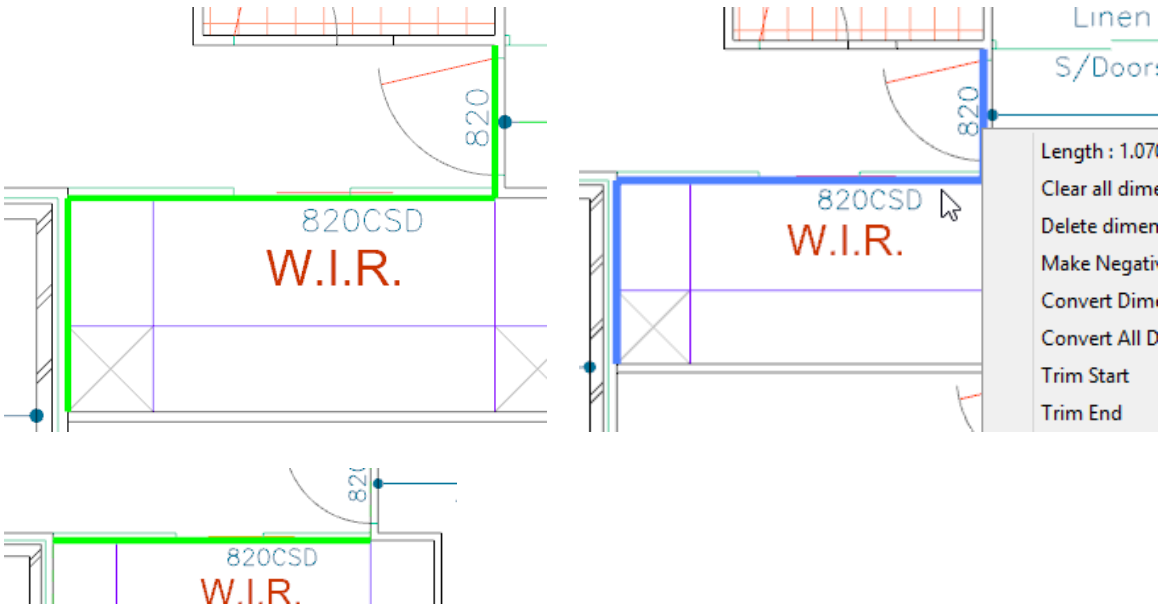
Vector lines sometimes extend beyond the point at which you want to start or end a measurement, in which case it is necessary to "trim" the line. For instance the partition wall between the Walk In Robe (W.I.R) and Bedroom 1 is drawn with various lines that extend beyond the junction with the intersecting walls. Clicking on this line would return a longer length than required. To overcome this the Trim Start/End function can be utilised to terminate the measurement at the junction with the corridor wall.

2.34. We wish to measure the length of the partition between Bedroom 1 and the WIR. If we click on the bedroom side of the partition, the measurement line continues along the external wall. If we click on the WIR side, it continues onto the corridor partition. We want to measure only the section of partition between the junction with the external wall at one end, and the junction with the corridor wall at the other.



2.35. To do this, we **use the *Combining Lengths* method** (Ctrl key) to include the adjoining walls as part of a combined partition length, and then trim off the unwanted sections at the start and/or end of the combined length. For this example we will combine three lengths into a single measurement. **Click** on the inside face of the adjoining external wall, **hold the Ctrl key** and **Click** on the partition and then **Click** on the face of the adjoining corridor wall as shown below.

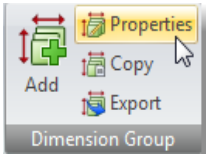
2.36. To remove the extraneous lengths at the start and end of the measurement, **move the cursor over the green measurement line** so that it turns blue. **Click the right mouse button** and **select Trim Start**. Then select the line again, **right click and select Trim End.**



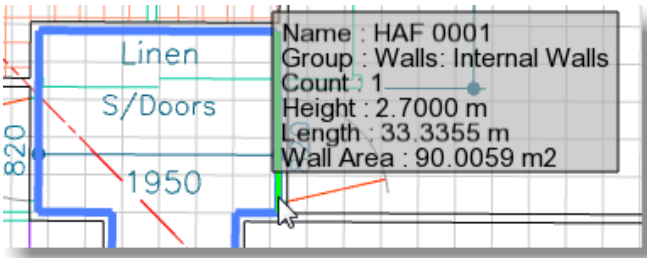
Default Heights

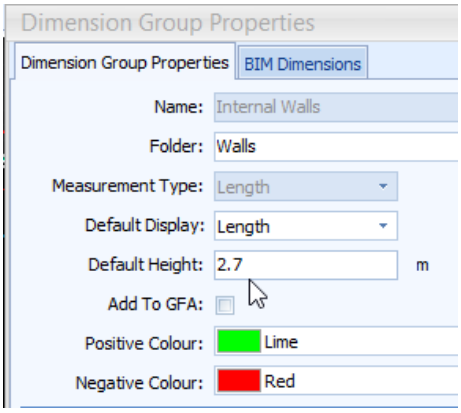
Any measurement done in CostX® can be assigned with a Height. CostX® will utilise this Height to calculate additional quantities including Wall Area and Volume.

2.37. To assign a **[Default Height]** to the **{ Internal Wall }** Length that was measured, **open** the Dimension Group Properties using the **[Properties]** button in the **[Dimensions]** ribbon (ensure the Internal Walls dimension group is selected prior).



2.38. **Type** a height of 2.7m in the **[Default Height]** field and **select [Update]**. When asked "Would you like to apply the new height to all dimensions in this dimension group?" **select yes**, this will assign 2.7m as the height for all length measures taken prior.





If the cursor is brought over the corridor wall dimension a hint box will open to display the Wall Area. Hovering over the dimension group Internal Walls will also display the same data.

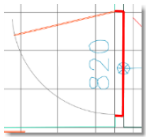
Deductions for Openings

Deductions can now be made for door opening using the Negative function previously covered.

2.39. First **select** the **[Negative]** button on the Dimensions ribbon.

2.40. **Move the cursor** over the **first door opening** and you will notice that the sticky cursor highlights the entire wall face, extending past the reveals of the opening on both sides.

2.41. To overcome this firstly select one reveal line of the opening then use the ***Combining Lengths*** **method (Ctrl key)** to **measure around the opening** as shown.



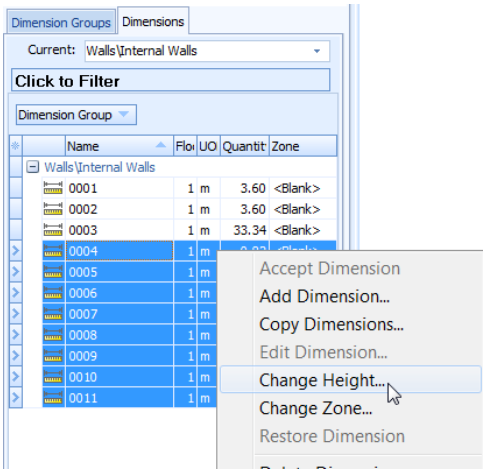
2.42. To remove the extraneous length in the reveals, **move the cursor over the red line** so that it turns blue. **Click** the **right mouse button** and **select [Trim Start] . Repeat this process to [Trim End]** leaving only the door width measured.

An alternative is to use the square bracket '[' and ']' short-cut keys to trim the ends of the length.

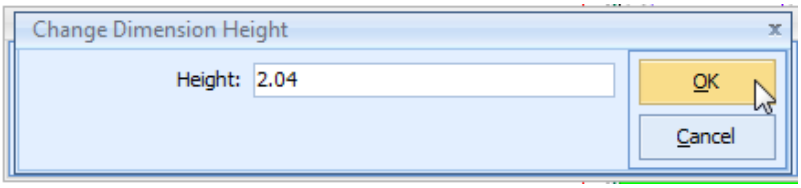
2.43. Once all deductions are complete select the **[Both]** button in the Dimension ribbon, this will show the positive lengths in green and the deducted lengths in red. Note however if you review the individual dimension taken using the Dimension tab all lengths have been given a default height of 2.7m, including all door opening deductions. These need to be amended to deduct only the door height.

2.44. Click the **[Dimension]** tab

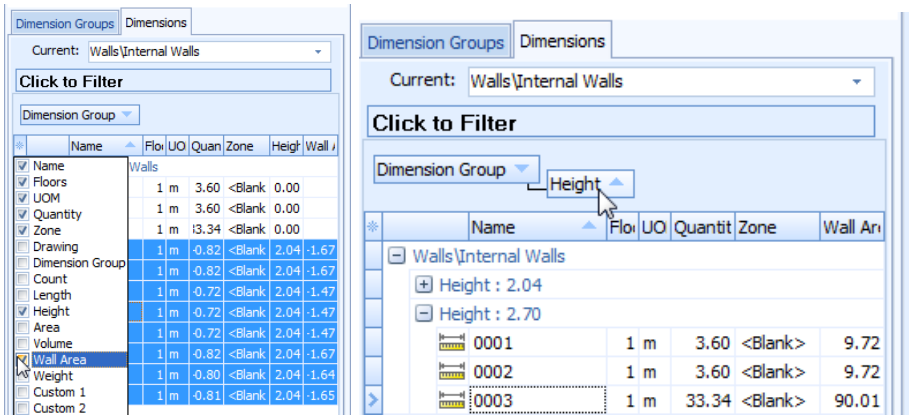
2.45. **Select** the first deduction dimension, then **hold the Shift key** and **select** the last deduction. This will 'multiple select' all deductions. **Right click** and **select [Change Height…]**



2.46. Now change the **[Height]** to **2.04**, this height will now be applied to all door deductions, giving a more accurate Wall Area.

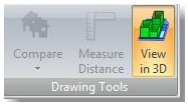


Columns in the Dimensions Window can be customised by selecting the Left Top Customize Button. The columns Names can than be dragged to the section above to Filter:

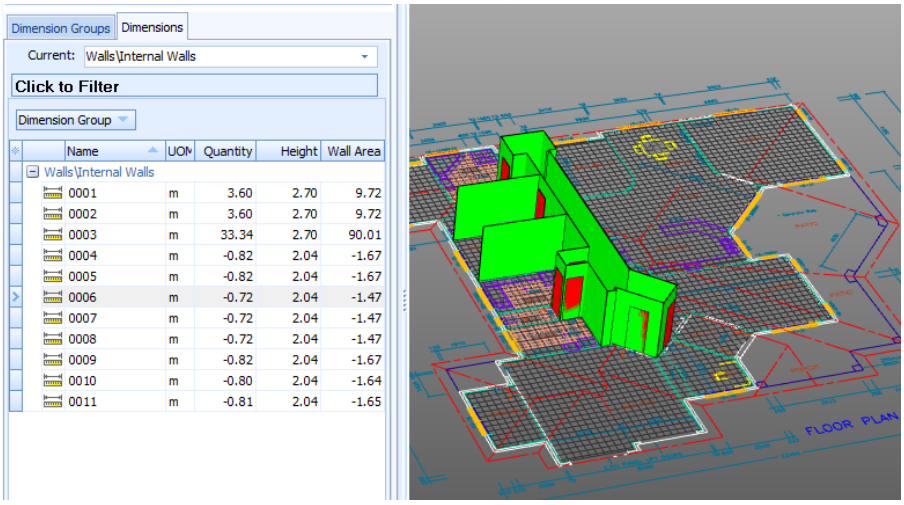


View in 3D for 2D Measurements and deductions

2.47. **Ensure** the **{ Internal Walls }** dimension group is **selected** and that the **[Both]** dimensions button is also selected. **Select [View in 3D]** button in the **[Drawings]** ribbon.

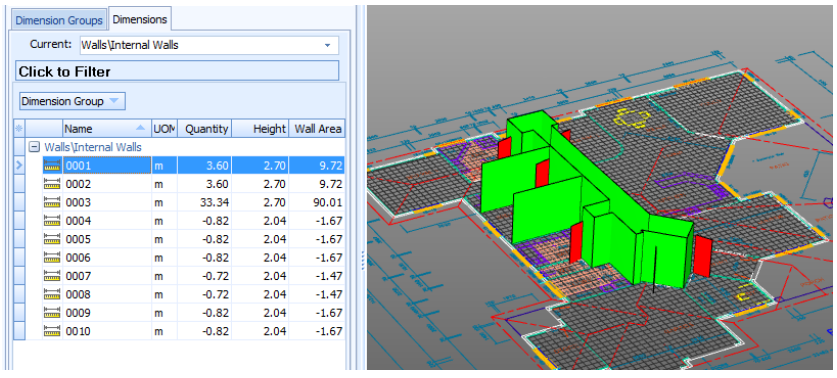


This feature will now display the internal wall measure in a 3 Dimensional view, the red will denote the door opening deductions, note that varying heights incorporated into a measurement will be displayed accordingly in this view.



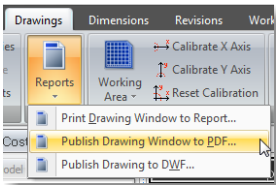
Name	UOM	Quantity	Height	Wall Area
Walls\Internal Walls				
0001	m	3.60	2.70	9.72
0002	m	3.60	2.70	9.72
0003	m	33.34	2.70	90.01
0004	m	-0.82	2.04	-1.67
0005	m	-0.82	2.04	-1.67
0006	m	-0.72	2.04	-1.47
0007	m	-0.72	2.04	-1.47
0008	m	-0.72	2.04	-1.47
0009	m	-0.82	2.04	-1.67
0010	m	-0.80	2.04	-1.64
0011	m	-0.81	2.04	-1.65

Note in this example we have taken the time to measure across the doorways, and then trimming out the extraneous measures from the reveals. However, a much simpler solution is to measure the deductions off the door leaf, which would not require any trimming. The resulting net wall area will remain the same, however when the View in 3D function in used, the deducted doors will appear to extend from the wall, hence may not look like the door area has been deducted from the wall area.



Name	UOM	Quantity	Height	Wall Area
Walls\Internal Walls				
0001	m	3.60	2.70	9.72
0002	m	3.60	2.70	9.72
0003	m	33.34	2.70	90.01
0004	m	-0.82	2.04	-1.67
0005	m	-0.82	2.04	-1.67
0006	m	-0.82	2.04	-1.67
0007	m	-0.72	2.04	-1.47
0008	m	-0.72	2.04	-1.47
0009	m	-0.82	2.04	-1.67
0010	m	-0.82	2.04	-1.67

2.48. These views can be printed out to a report using the **Reports** button under the **[Drawings]** ribbon.



2.49. **Select** the **[View in 3D]** button to return to normal measure mode.

Measuring Counts (PFC 2-8)

2.50. **Select** the **{ 820mm Doors }** dimension group.

From Raster JPEG Drawing

2.51. **Open** the **{ House – Raster JPEG }** drawing.

2.52. **Click** over each internal and external **820mm wide swinging door**. Each click will register a count and will be denoted by a green dot.

From Vector PDF Drawing

2.53. **Open** the **{ House – Vector PDF }** drawing.

2.54. **Attach** the **sticky cursor to** each internal and external 820mm wide swinging **door leaf** and **click** to count. Each click highlights the door leaf green.

From DWG Drawing

2.55. **Open** the **{ House – DWG }** drawing.

2.56. Find an 820mm wide swinging door and **move the mouse cursor over the door leaf** or swing arc. Without clicking, **hold down the Shift key**. Both the leaf and arc will highlight blue to denote that they are joined in what is called a Block Object within the CAD file. Whilst still holding the Shift key, **click** and the count will register and the entire block will highlight green.

> *(Note that without using the Shift key, if the leaf and the arc had each been clicked in turn, two counts would have registered).*

2.57. **Move the cursor over the door** to highlight it blue, **click the right mouse button** and then **click [Delete dimension]**.

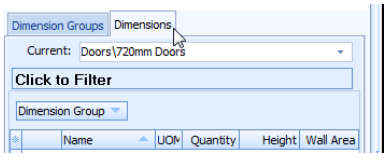
2.58. **Hover over the door again** and **hold down the Shift key** to highlight the block object. Without clicking, now also **hold down the Ctrl key**. This will highlight all blocks with the same CAD identifier as that chosen. A single **click** will now count all highlighted blocks at once.

2.59. **Select** the **{ 720mm Doors }** dimension group and **repeat this process** to count all of the 720mm wide doors simultaneously.

Dimension Labels

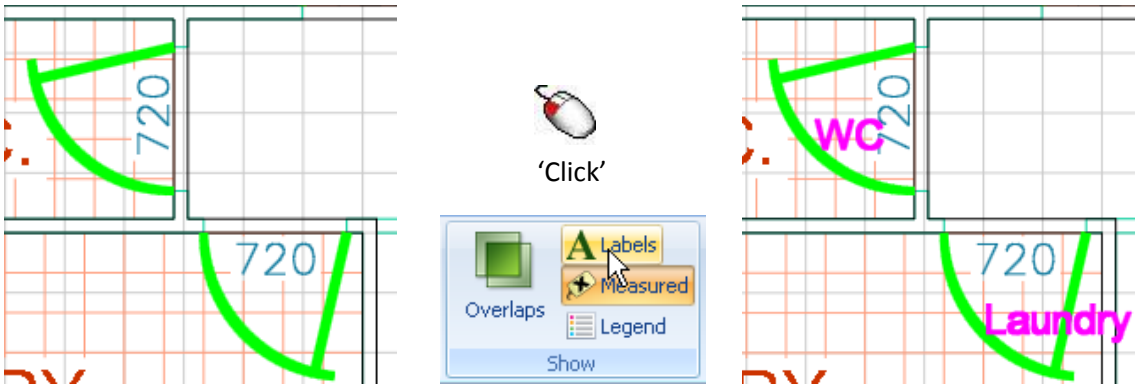
2.60. **Click** on the **[Dimensions]** tab to show a list of all individual measurements taken for the selected Dimension Group.

2.61. **Move the cursor over a measured item** on the drawing. The applicable dimension will highlight grey in the Dimensions list.



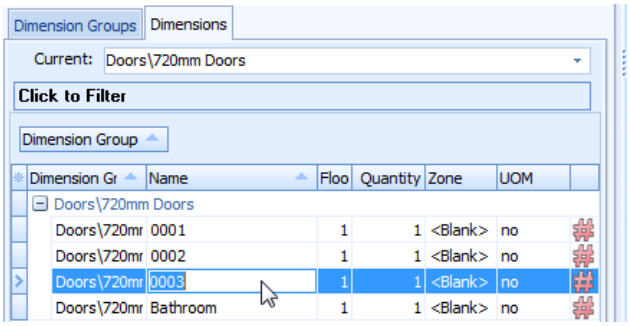
2.62. **Click** on any Dimension in the **[Dimensions]** list to select it. The respective measured item on the drawing will highlight blue.

2.63. Each dimension is automatically labeled with a sequential number. **Click** the **[Labels]** button in the Dimensions ribbon menu to show or hide these on the drawing.



2.64. **Click** on each **Dimension** in the **[Dimensions]** list in turn and **over-type the [Name]** to assign your own description to individual dimensions.

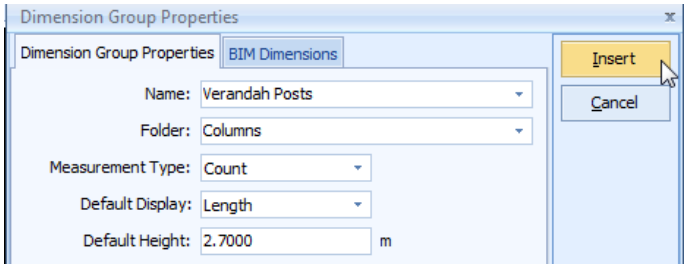
2.65. **Click** the **[Labels]** button again to hide labels from the drawing.



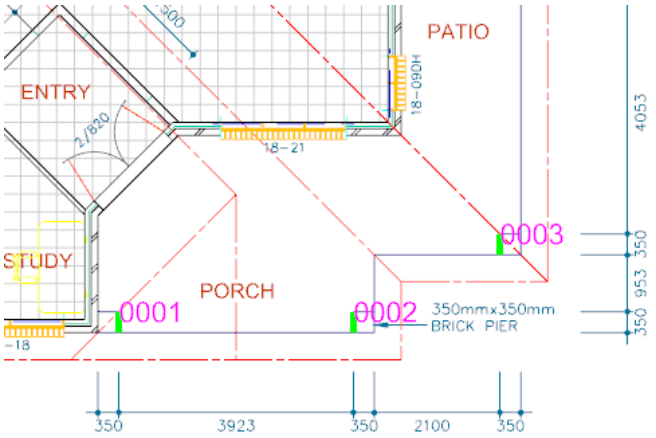
Default Display

In CostX®, Dimension Group properties may be set to display an alternate unit to the unit of measurement. For example, you may be measuring walls by length, but would like the default display of the Dimension Group to be wall area rather than length. In the following example we display a length (height) quantity for an item being measured by count.

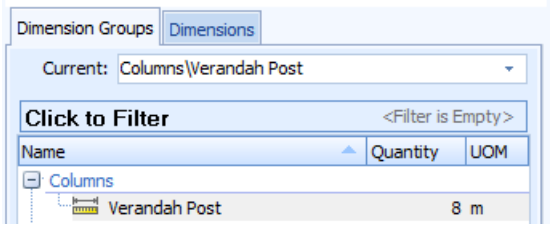
2.66. **Add a Dimension Group** called **{ Verandah Posts }** in a **folder** called **{ Columns }** with a **[Measurement Type]** of **Count** and **[Default Display:]** of **Length**. **Enter** a **[Default Height:]** of **"2.7"**m.



2.67. **Click** on each **vertical posts** located in the Porch and Patio areas to count them.



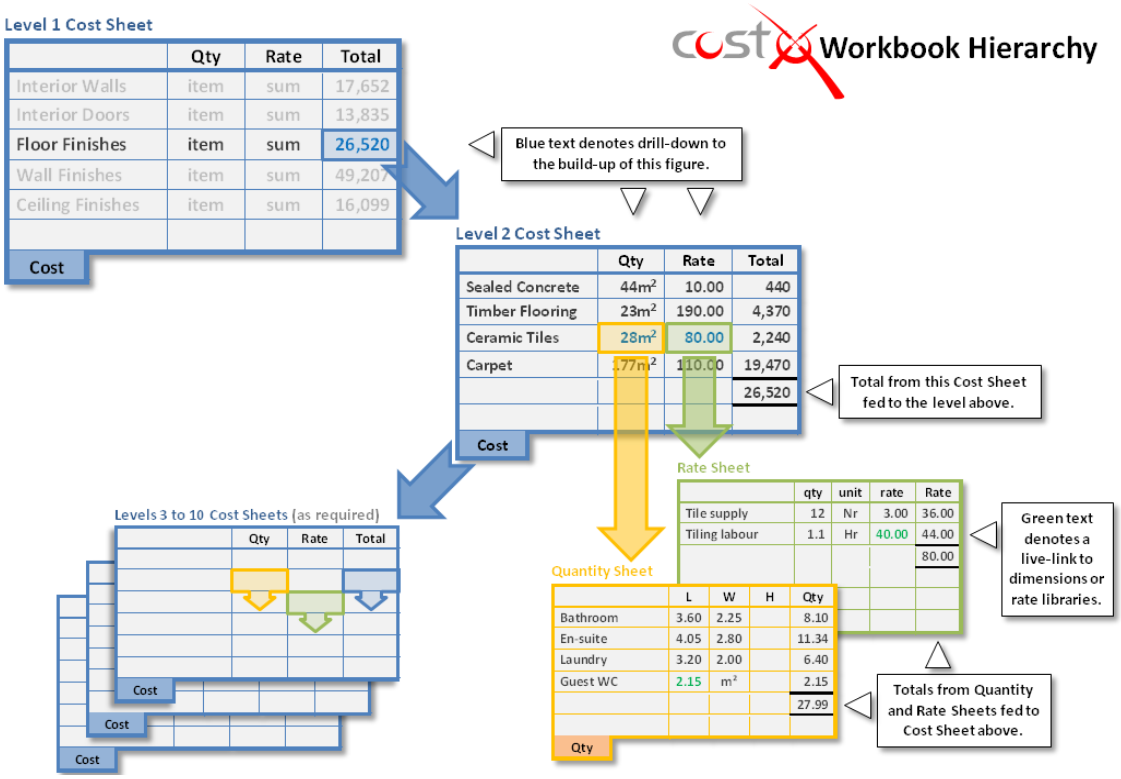
2.68. CostX® will display the total length of these posts instead of the count.



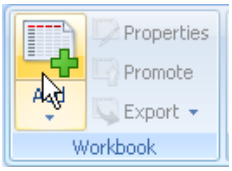
Workbook Overview (PFC 3-1)

Once established, Workbooks in CostX® can be held in templates for copying onto future jobs, or can be copied from previous jobs, complete with any links to Dimension Groups, Rate Libraries, etc. For the purposes of this exercise we shall start with a blank sheet and create a simple workbook linked to the Dimension Groups used in the previous exercises.

CostX® workbooks are hierarchical and comprise of up to ten layers of Cost Sheet build-up, each with their own Quantity and Rate build-up sheets. Within each sheet different text colours exist to identify that additional build-up information exists, or that live-links to Dimension Groups or Rate Libraries exist (see below).



Adding New Workbook



2.69. **Click** on the **[Workbooks]** tab at the top of the screen to open the ribbon menu and the **[Costing View]**. **Click** on the **[Add]** button. If the drop-down menu appears **click** on **[Add Workbook]**.

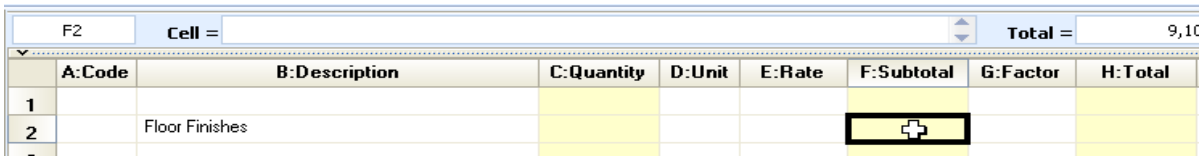
2.70. In the **[Workbook Properties]** window enter a **[Name:]** for your workbook such as "**Estimate**". Note the Based On section at the bottom where prior workbooks to copy can be selected. Ignore this for now and **click [Insert]**.

A blank workbook in spreadsheet format will open with the tab at the bottom called Cost selected. Up to ten layers of cost build-up can be created starting from this top layer (Level 1). In this exercise we shall enter headings at Level 1 of the workbook before drilling-down to Level 2 to enter details relating to those headings.

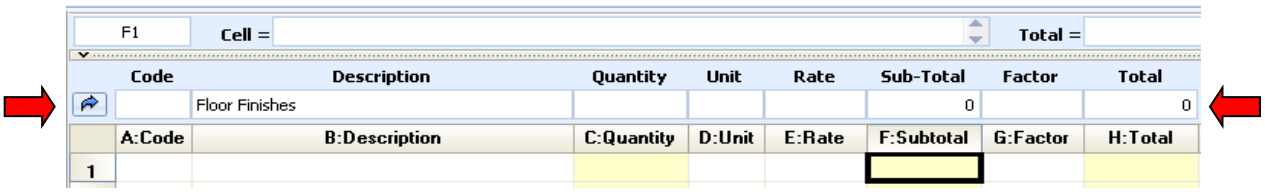
Workbook Hierarchy

2.71. On row 2 of column **[B:Description]** in the workbook, enter a heading of '**Floor Finishes**'.

2.72. **Move the cursor to** column **[F:Subtotal]** of the same row and **double-click** the **left mouse button**.



This will open a blank Level 2 Cost sheet with a row of fields above the column headings (see below). This contains details of the row in Level 1 of the workbook from where we drilled-down, and to which the information entered on this worksheet will be summarised.



2.73. In cell B2 of this worksheet **enter** a heading of '**Carpet**'. Note that this may be made bold and underlined, etc.; by use of the **[Format]** buttons in the ribbon menu.

Dragging and Dropping Dimension Groups into Workbooks (PFC 3-2)

2.74. In the list of Dimension Groups to the left of the workbook, **click** on the ⊞ button to open the Rooms Dimension Group Folder.

2.75. **Click** on the **{ Bedrooms }** dimension group and, **holding** the **left mouse button** down, **drag the mouse cursor** to cell **[B3]** of the workbook. The entire row will highlight. Release the mouse button and an **[Add Quantity]** window will appear.

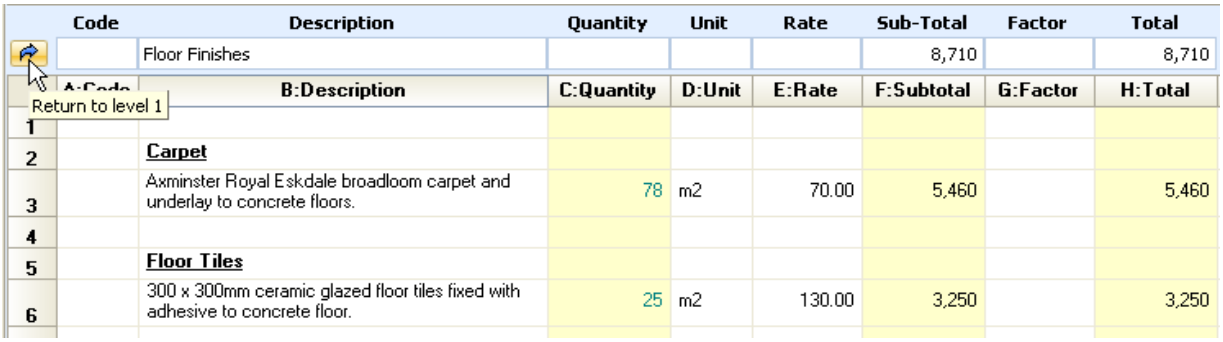
2.76. In the **[Description:]** field over-type the word '**Bedrooms**' with a suitable description of a carpet measurement item. Ensure that the **[Quantity Type:]** field is set to **Area**, and **[Rounding]** set to **0 Decimal Places**, then in the **[Rate:]** field near the bottom **enter** an **appropriate price** per square metre. **Click [Update]**. A priced, measured estimate item will be entered in the workbook.

2.77. **Enter** a heading of '**Floor Tiles**' in cell **B5**.

2.78. **Select** the **{ Bathrooms }** dimension group and drag-and-drop it into cell B6. In the Add Quantity window **enter** a suitable **[Description:]** of floor tile, ensure the **[Quantity Type:]** is set to **Area**, and **[Rounding]** set to **0 Decimal Places**, then **enter** an appropriate **[Rate:]** before **clicking [Update]**.

You should now have a Level 2 worksheet containing two priced estimate items the total of which will be shown in the summary fields for the preceding workbook level above.

2.79. **Click** on the **button** to the left of these fields to 'roll-up' to workbook Level 1.



	Code	Description	Quantity	Unit	Rate	Sub-Total	Factor	Total
		Floor Finishes				8,710		8,710
	A:Code	B:Description	C:Quantity	D:Unit	E:Rate	F:Subtotal	G:Factor	H:Total
1								
2		**Carpet**						
3		Axminster Royal Eskdale broadloom carpet and underlay to concrete floors.	78	m2	70.00	5,460		5,460
4								
5		**Floor Tiles**						
6		300 x 300mm ceramic glazed floor tiles fixed with adhesive to concrete floor.	25	m2	130.00	3,250		3,250

Return to level 1

Level 1 of the workbook will now show a total for Floor Finishes derived from the items measured and priced at Level 2 beneath. The blue text colour in the F:Subtotal field identifies that sub-sheet information exists.

2.80. Now, in cell B3 of the **Level 1** worksheet **enter** a heading of **Ceiling Finishes**. **Double-click** on cell **F3** to drill-down to Level 2, as before.

2.81. In cell B2 of the Level 2 worksheet **enter** a suitable **description** for a plasterboard ceiling.

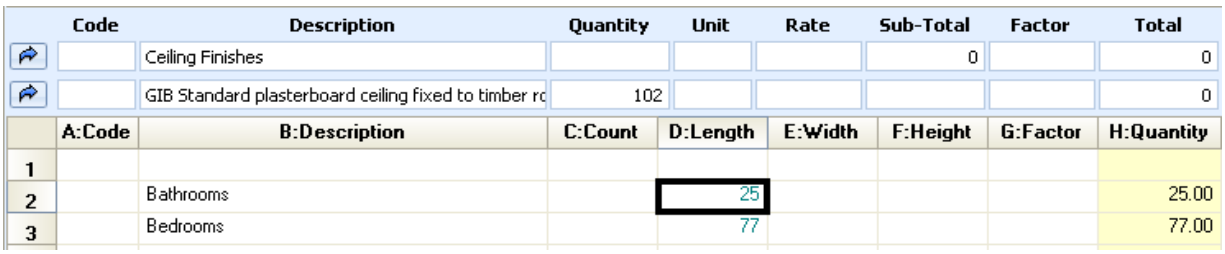
2.82. **Move** the mouse over the **[C:Quantity]** column for this row and **double-click** the left mouse button.

A quantity build-up worksheet (Qty) will open containing columns for count, length, width and height (as opposed to quantity, unit and rate on a Cost sheet). Again a summary row will open above the column headings.

2.83. In the list of Dimension Groups to the left of the workbook, **click** on the **{ Bathrooms }** dimension group to select it then, **holding the Shift key**, **click** on the **{ Bedrooms }** dimension group to select both simultaneously.

(As an alternative, holding the Ctrl key down allows individual non-adjacent Dimension Groups to be selected simultaneously).

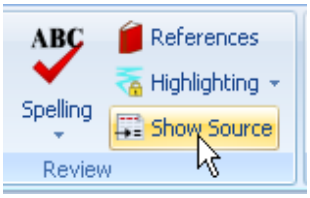
2.84. **Holding the left mouse button down**, **move** the cursor to column **[D:Length**] of the workbook and **release the mouse button**. When the **[Add Quantity]** window appears simply **click [OK]** to drop the Dimension Group information into the workbook. The total quantity for the area of the bathrooms and bedrooms is outlined in the summary fields above the column headings.



	Code	Description	Quantity	Unit	Rate	Sub-Total	Factor	Total
		Ceiling Finishes				0		0
		GIB Standard plasterboard ceiling fixed to timber rc	102					0
	A:Code	B:Description	C:Count	D:Length	E:Width	F:Height	G:Factor	H:Quantity
1								
2		Bathrooms		25				25.00
3		Bedrooms		77				77.00

Note that the quantities text is green which denotes 'live-linked' information.

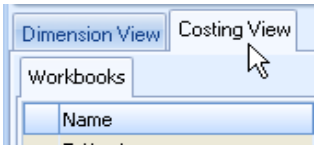
2.85. **Click** on the **[D:Length]** cell for **Bathrooms**. In the ribbon menu **click** the **[Show Source]** button. The Dimension View will open displaying a drawing with the Bathrooms dimension group and associated measured area highlighted.



2.86. Note the area of the Bathrooms dimension group then, using the methods learnt earlier, **measure** the **area of the WC** adjacent to the Bathroom from each drawing.

> *On the Raster JPEG drawing the cursor may attach to the previous bathroom measurement points preventing you from clicking on the WC area. To overcome this, hold the O key (overlap) whilst clicking to start the new area near to the prior measurement, if you find that the new area snaps to an existing point, the Snap button in the Dimensions ribbon can be utilised to override this. Note the new area will cause The Dimension Group quantity to increase.*

2.87. **Click** on the **Costing View** tab to re-open the workbook. Note that the Bathrooms quantity in the workbook has automatically been updated by the live-link to reflect the increased measurement. However this update is only applied to the current sheet in view, to apply the update across the workbook, **select** the **[Recalculate Workbook]** button in the **[Workbooks]** ribbon.



2.88. **Click** on the lower **button** to return to Level 2 of the workbook. The total quantity of measured areas is shown in the C:Quantity column and is blue denoting the existence of drill-down information beneath.

2.89. **Enter** '**m2**' as the unit of measure in the **[D:Unit]** column and then **double-click** in the adjacent **[E:Rate]** column.

> *This opens a Rate sheet where any amount of rate build-up information can be entered, the total of which will be included in the cell that was drilled-down from.*

2.90. **Enter** a rate build-up such as that outlined below then **click** on the lower **button** to return to Level 2 of the workbook. The total rate is shown in blue to advice of drill-down information.

A:Code	B:Description	C:Quantity	D:Unit	E:Rate	F:Factor	G:Total	H:Include
	Plasterboard supply	1.00	m2	8.20		8.20	8.20
	Labour	0.22	hr	30.00		6.60	6.60

2.91. **Click** on the **button** to return to Level 1 of the workbook which will now contain summary totals for Floor Finishes and Ceiling Finishes.

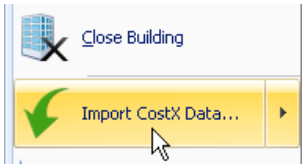
> *Note that in this exercise the same room-related Dimension Groups were used to derive the quantities of both floor and ceiling finishes. This approach leads to economy of measurement where the same Dimension Groups are used repeatedly as opposed to establishing separate Groups for each element. This concept will be explored further in Module 5.*

Module 3: Preparing a GFA Budget

As previously noted, once Dimension Groups and Workbooks have been created and live-linked together they may be used as a template for future jobs. For Module 3, a Building file previously created in CostX® has been exported as a file called Concept Stage Training Template, containing two workbooks and their associated Dimension Groups. We shall now import this template and use it to create a new Building file, add a drawing and use the invert layers function to simplify measurement of the building's GFA (Gross Floor Area). The imported template's workbooks will then automatically update to produce a high level budget estimate based on the GFA measure.

Importing Template Files (PFC 3-5)

3.1. **Click** the **[Main Menu]** button and **select** the option to **[Close Building]**.



3.2. **Click** the **[Main Menu]** button again and **click** on **[Import CostX® Data]**.

3.3. Browse for and **select** the file named '**Concept Stage Training Template.exf**' then **click [Open]**.

3.4. A **[Select Data To Import]** window will open listing the chosen file (Building). **Click** on the **[Select]** button and a second window will appear prompting for a Project to attach the imported Building to. **Highlight** the '**Training-Your Name**' Project that you established earlier and **click [Select]**. A confirmation will appear advising that the import completed. Click OK.

A template Building file with workbooks and Dimension Groups has now been imported and saved into your Project (Note that in the 'live' environment the imported file may have been saved in the <Templates> folder). We shall now import a rate library file that is referenced by those workbooks.

3.5. **Open** the **[Main Menu]** again and **click** on **[Import CostX® Data]**. Browse for and **select** the '**Elemental Template Rates.exf**' file then **click [Open]**. A window will open listing the chosen file (Rate Library). **Click [Select]** and the Library will import straight away without needing to be attached to a Project. An "Import completed" confirmation will appear. **Click [OK]**.

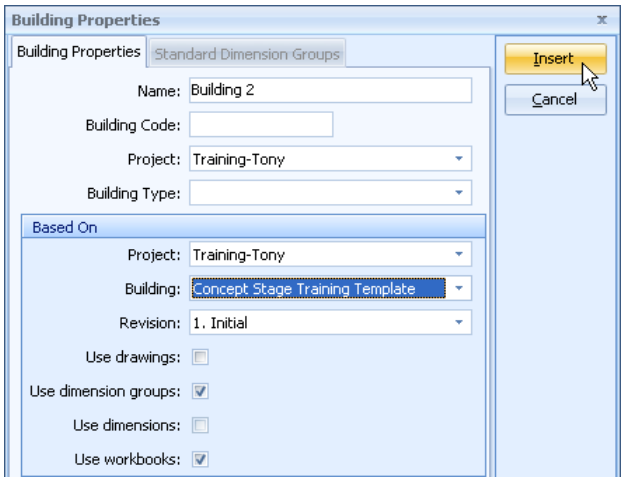
Creating a New Building Based On a Template File (PFC 3-6)

Having imported a template Building file into CostX® we shall now use it to create a new Building.

3.6. **Open** the **[Main Menu]** and click **[New Building]**.

3.7. **Enter** a **[Name:]** of "**Building 2**" and, using the drop-down menu, attach it to the **[Project:]** '**Training-Your Name**'. Do not **click [Insert]** yet.

3.8. In the **Based On** section of the **[Building Properties]** window, use the drop-down menus to **select** the **[Project:] 'Training-Your Name'**, and the **[Building:] Concept Stage Training Template** to copy from. Ensure that the **[Use Dimension Groups:]** and **[Use Workbooks:]** check boxes are ticked then **click [Insert]**. A new Building, based on the imported template, will open containing a set of Dimension Groups and two Workbooks. **Click** on the **[Costing View]** tab to see these.



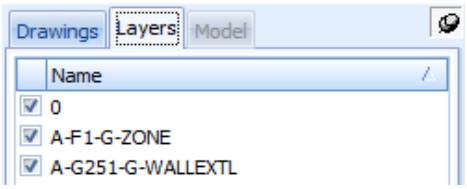
3.9. **Click** on the **[Dimension View]** tab then **Add** the **{ House - DWG.dwg }** drawing.

Inverting Layers

> *In earlier exercises, measurement was simplified by the ability to remove unwanted layers from view, making the drawing less cluttered. This exercise introduces the Invert Layers function. It may be found preferable to work in the Home tab when measuring quantities, as the ribbon contains the most commonly used control buttons.*

The first item to be measured on the Dimension Group list is the FECA (Fully Enclosed Covered Area) which is a component part of the GFA (Gross Floor Area).

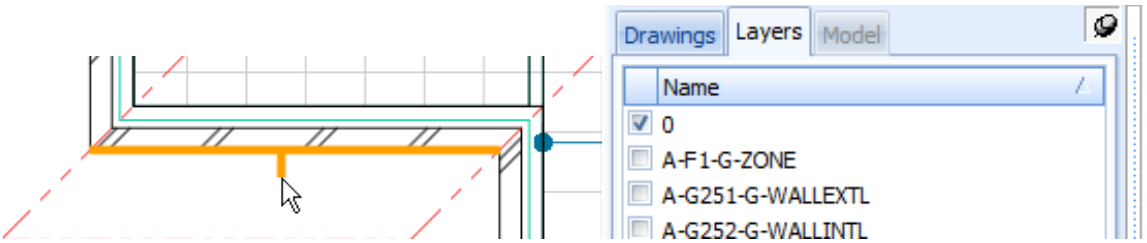
3.10. To optimise the displayed layers to measure the FECA, first **click** the **[Layers]** tab above the list of drawings.



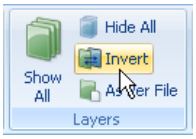
3.11. **Move the cursor** over the drawing and items will highlight orange.

> *Note that if you hold the Shift key when an item is highlighted orange, the entire contents of that layer are highlighted so that you can see the full extent of what will be removed.*

3.12. **Zoom in** as necessary to highlight the face of the external walls then **click** the **left mouse** button to remove the layer (**A-G251-G-WALLEXTL**). **Repeat** this process to remove the external walls hatching (**A-Z005-H-BKWK**), internal walls (**A-G252-G-WALLINTL** and **A-F1-G-ZONE**), windows (**A-G34-G-BKWKWNDW**) and patio (**A-G711-G-SITESURFHARDPATI**) layers.

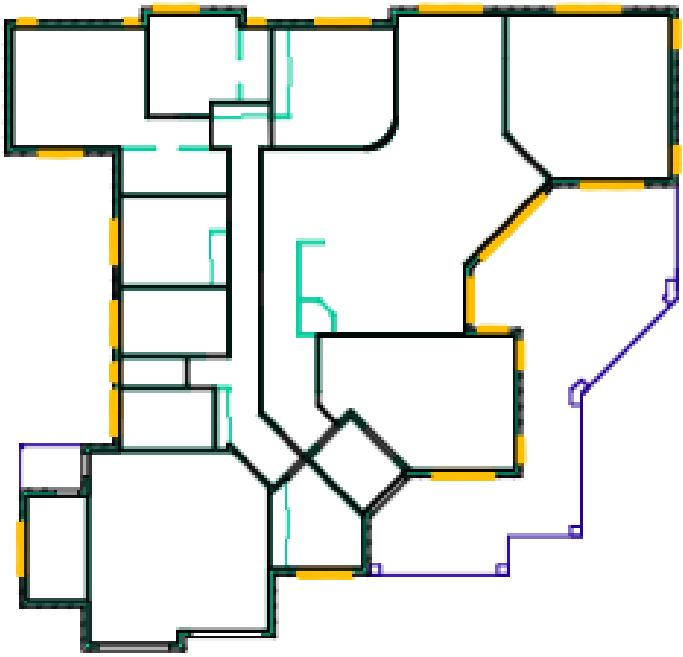


3.13. When the six layers have been removed, **click** the **[Invert Layers]** button on the **[Home] or [Drawings]** ribbon. The layers that were removed will now appear, and those that remained will no longer be shown. The drawing should be as below.



If there are any unwanted layers in view, simply move the mouse over them so that they highlight orange then click the left mouse button to remove the layer. If any layers are missing, click on the Invert Layers button again, move the mouse over the required layer so that it highlights orange and then click to remove it from view. Once all of the required layers have been removed from the view, click the Invert Layers button again to show the removed layers.

3.14. **Click** the **[Drawings]** tab above the list of drawings to revert back to measurement mode. You cannot measure whilst the Layers screen is open.



Each time measurement of a new dimension group commences the optimum screen view can be created by first clicking on the Show All Layers button to reinstate all layers, then repeating the process of hiding and/or inverting selected layers.

GFA Measurement (PFC 2-6)

As seen previously the House - DWG drawing has polylines which can be used to measure quickly.

3.15. In the **{ 00 AREAS (GFA) }** folder **select** the **{ FECA }** (Fully Enclosed Covered Area) dimension group.

3.16. **Move** the cursor towards the inside face of the **exterior wall**. **Hold down** the **L key** and **click** the **left mouse** button (*Polyline* method) to measure the FECA with a single click. Note that the quantity appears in the dimension group.

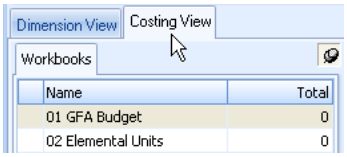
3.17. **Select** the **{ UCA }** (Unenclosed Covered Area) dimension group. In this instance there are no polylines enclosing the patio and porch areas so measurement must be taken by other means.

3.18. To measure the patio and front porch area **click once at every change of direction** around the perimeter to define its borders (*Standard* method) then **press enter** to complete the area.

3.19. **To measure the rear porch** move the mouse cursor over the area then **hold down the Shift key** to define it (*Quickpoint* method). **Click** the **left mouse** button to capture the measurement.

GFA Budget Workbook (PFC 3-4)

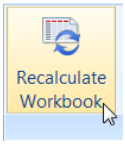
3.20. **Click** the **[Costing View]** tab to switch to the workbooks. **Click** on the **{ 01 GFA Budget }** title to open the workbook which was copied in from the template and has already been setup with live-links to the Dimension Group quantities.



3.21. The rates for each item have been linked to a rate library. To select a rate library **click** on the **[Properties]** button on the **[Workbooks]** ribbon, or **double click** on the workbook name.

3.22. In the **[Workbook Properties]** window use the **[Default Rate Library:]** drop-down menu to select the **{ Elemental Template Rates }** library imported earlier. **Click [Update]**.

3.23. **Click** the **[Recalculate Workbook]** button to update live-links and refresh the workbook.



The 01 GFA Budget workbook, copied from the imported template and live-linked to Dimension Groups copied in from the template, has now been completed based on simple GFA measures.

Module 4: Elemental Unit Measurement

In Module 4 we shall utilise the differing measurement methods and tools learnt already to complete the second, more detailed, 02 Elemental Units workbook that was copied in from our template Building file. We shall also learn how to annotate drawings, apply Default Heights to Dimension Groups, identify duplicate measurements, trim Dimensions, insert manual Dimensions and measure around curves.

Measuring – Point Mode (Raster)

- ***Areas*** - click once on a corner of the area to be measured then move the mouse to the next corner and click again. Continue to click the cursor at each corner to enclose the area then at the last corner, before returning to the start, press enter.
- ***Lengths*** – click on the end of a length to be measured. Hold the Ctrl key and move the mouse to the end of the length then click to capture it. Keep holding the Ctrl key to add further lengths to the first, or release the Ctrl key to start a new length.
- ***Counts*** – click on the item to register a count.

Measuring Areas – Line Mode (Vector)

- ***Standard*** – click on perimeter of area to define its borders, click once at every change of direction and press enter or right click to complete the area.
- ***Quickpoint*** – press and hold the Shift key to measure a rectangular area.
- ***Quickpoint Combining Areas*** (for irregular-shaped area) – press and hold Shift key to measure area 1, press and hold Control key (do not release Shift key) and click to measure adjacent area(s) – the areas will be combined.
- ***Polyline*** – press and hold L key whilst holding the cursor over the perimeter of an area. If a polyline is available, the area will be highlighted blue. Click once to capture the area.

Measuring Lengths – Line Mode (Vector)

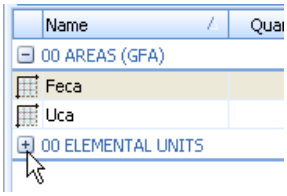
- ***Standard*** – click on lines to measure the length of the item.
- *Combining Lengths* - press and hold Control key to measure the length of combined items, click once at every change of direction.
- ***Trimming Lengths*** –use of the right mouse menu to *trim start/end* at intersections of lengths measured using *Combining Lengths.*
- ***Polyline*** – press and hold L key whilst holding cursor over a line. If a polyline is available, the full perimeter of an area will be captured with a single click.

Measuring Counts – Line Mode (Vector)

- ***Standard*** – click on the item to register a count.
- ***Blocks*** – press and hold Shift key to highlight the item as a drawing block (object – usually but not always doors, sanitary fixtures, etc.) then click.
- ***Multiple Counts*** – press and hold Shift and Control keys, then click to count all like *Blocks*.

Footprint

4.1. **Open** the **[Dimension View]** and expand the **{ 00 ELEMENTAL UNITS }** dimension group folder by clicking the ⊞ button.



4.2. **Select** the **{ 01 Footprint }** dimension group and **use the *Standard* method** to measure the area round the outside face of the exterior wall and patios.

Roof

4.3. **Click** the **[Show All Layers]** button and then **click** on the **[Layers]** tab.

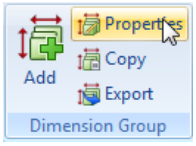
4.4. **Hide** the **Roof layer** (A-Z005-C-SYMBROOFLINE) then **click** on **[Invert Layers]**. **Click** the **[Drawings]** tab.

4.5. **Select** the **{ 05 Roof }** dimension group and **use the *Standard* method** to measure the roof plan area.

Windows

4.6. **Select** the **07 Windows** dimension group.

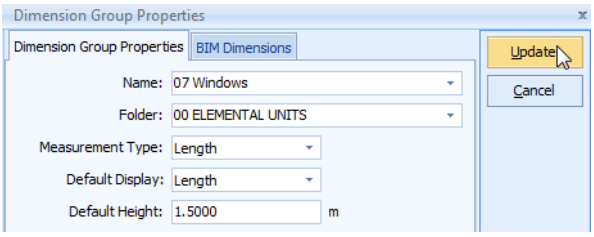
> *Note that because the windows are being measured from a plan, this dimension group requires measurement in m and not m². A default height for the windows can, however, be nominated in the Dimension Group to enable the vertical area to be used in the workbook.*



4.7. On the **[Dimensions]** ribbon menu **click** the **[Properties]** button, or **double click** on the **Dimension Group name** to open the Dimension Group Properties window.

4.8. **Insert** a **[Default Height:]** of **1.50** (m) and **click [Update]**. **Click [Yes]** to warning message

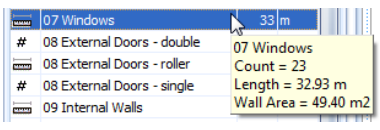
> *If there were varying window heights a separate Dimension Group could be created for each one, noting the height in the name. Use abbreviations and a naming protocol for quality assurance purposes. Remember all Dimension Groups must have a different name.*



4.9. From what you have learnt, **select** the **windows layer** and **invert** so only the windows are shown.

4.10. Use the *Standard* length measurement method to **measure** the **length of each window**.

4.11. **Move** and **hold the cursor** over the **{ 07 Window }** Dimension Group name. An information box opens showing the total length measured, along with the number of windows (Count) and the vertical area (Wall Area).



4.12. It is possible to add notes to a drawing. To do this, **move the cursor** towards a line or object, **click** the **right mouse** button then **select [Create Markup]** from the menu.

4.13. In the **[Add Markup]** window **type** the words, "**All windows measured 1.50m high**" and **click [OK]**.

4.14. A note is now indicated on the drawing. This can be moved around by clicking and dragging either the text or arrow. **Point at the text**, **click** the **right mouse** button and **select [Delete Markup]**.

External Doors – double

4.15. Change the layers to **show the doors and external walls layers only** then **click** on the **[Drawings]** tab.

4.16. **Select** the dimension group called **{ 08 External Doors – double }**.

4.17. **Move** the **cursor** over the **entry double door** and use the *Blocks* method to **count** one of the **doors**. If both are clicked the count will register as two doors.

External Doors - single

4.18. **Repeat** the ***Block* measurement** process for the **{ 08 External Doors – single }** dimension group.

Internal Doors - single

> *In CostX® it is possible to measure all similar block objects by holding the Ctrl key at the same time as the Shift key before clicking the left mouse button.*

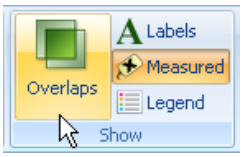
4.19. **Select** the **{ 11 Internal Doors – single }** dimension group and use the *Multiple Counts* method (Shift + Ctrl) to **measure** the **doors**. All doors which are drawn as multiple blocks will be measured.

> *Note that you will need to pick up individual doors which are not typical. Do this by using the Blocks method, or for those that are not a block, simply click on them to register a count.*

Overlaps Feature

You may have noticed that the external doors have now been measured in the Internal Doors dimension group and therefore have been measured twice.

4.20. **Select** the **{ 08 External Doors – double }**, **{ 08 External Doors – single }** and **{ 11 Internal Doors – single }** dimension groups together by highlighting each in turn **whilst holding the Ctrl key**.



4.21. Then on the **[Dimensions]** ribbon **click** the **[Overlaps]** button. This will display any overlapping dimensions in yellow. Ensure this function is turned off before proceeding with further measurement.

4.22. To remove these doors from the Internal Doors dimension group, **select** that **{ 11 Internal Doors – single }** alone and **move the cursor over** each **external door** until it is highlighted blue. **Click** the **right mouse** button and select **[Delete dimension]**.

External Doors – roller

4.23. **Select** the **{ 08 External Doors – roller }** dimension group.

4.24. **Move** the **cursor over** the **garage door openings**.

The Dimension Group has been established to measure the width of the door openings however you will notice that the sticky cursor highlights the entire wall face, extending past the reveals of the opening on both sides.

4.25. To overcome this firstly **select** one **reveal line** of the opening then **use** the ***Combining Lengths* method** (Ctrl key) to **measure around the opening** as shown.

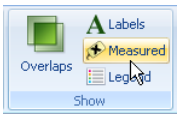
4.26. To remove the extraneous length in the reveals, **move the cursor over the green line** so that it turns blue. **Click** the **right mouse** button and **select [Trim Start]**. **Repeat** this process to **[Trim End]** leaving only the door width measured.

An alternative is to use the square bracket '[' and ']' short-cut keys to trim the ends of the length. Try this for the other garage door.

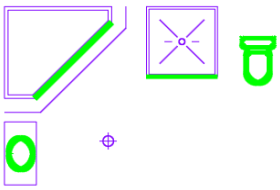
Sanitary Fixtures

4.27. **Select** the **{ 17 Sanitary Fixtures }** dimension group. **Show all layers** then **turn off** the sanitary fittings layer (**A-G4-G-FITT**) and **invert**. Only the fittings layer should be shown.

4.28. **Use the *Multiple Counts*** methods to **count the WC pans**. Then, in the **[Dimensions]** ribbon click the **[Measured Items]** button. The counted WC's become dimmed. **Measure** the **bath**, **basins** and **kitchen sink** noting how each measured item is dimmed enabling measurement by elimination. To show measured items click the button again.



4.29. Not all objects can be selected as blocks (e.g. **shower and spa bath**). For objects that cannot be selected as blocks use the *Standard* count technique and simply **select a line** on that object to measure as a count.

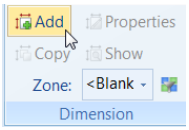


4.30. **Select** the **{ 10 Shower Screens }** dimension Group. **Click** on **each shower** to register a count.

Functional Units

4.31. **Select** the **{ 15 Functional Units }** dimension group.

4.32. As there is nothing to measure for this **click** the **[Add Dimension]** button (see right) on the **[Dimensions]** ribbon.



4.33. In the **[Dimension Properties]** window enter a **[Name:]** of "**Functional Unit**" and a **[Number:]** of 1. **Click [Insert]** to register a manual dimension entry.

Internal Walls

4.34. **Select** the **{ 09 Internal Walls }** dimension group. Use the **[Layers]** tab to **display** the internal wall (**A-F1-G-ZONE and A-G252-G-WALLINTL**) and external wall (**A-G251-G-WALLEXTL**) layers.

> *Although the dimension group has been established with a measurement type of Length, by entering a default height in the Dimension Group Properties the area of walls can be derived from multiplying the length by the height.*

4.35. **Double click** on the **Dimension Group name**, insert a figure of **2.70** (m) in the **[Default Height:]** field and **click [Update]**.

4.36. Remembering to **click** the **[Drawings]** tab first, use the following methods to measure the internal walls, measuring over all door openings (excluding the wardrobe sliders).

4.37. Use the ***Polyline*** **method** to **measure** the **corridor walls** in a single click.

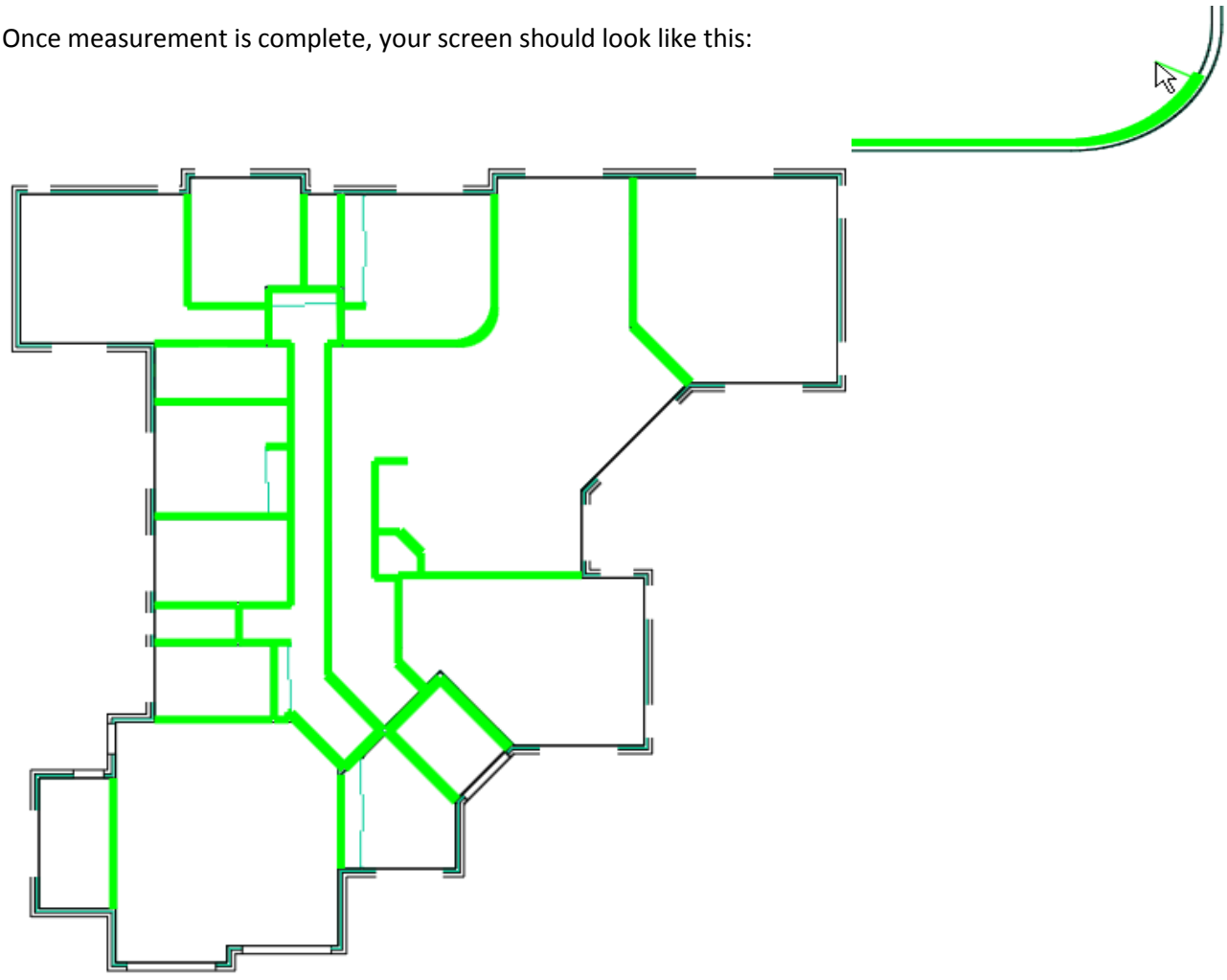
4.38. Use the ***Standard*** **method** to **measure** any single **straight wall lengths** with no openings.

> *Pay attention to which side of the wall you attach the sticky cursor to as the line on one side may extend further than on the other and be careful not to measure the internal skin of the external wall. Click on one side of each wall only. If needed, use the Trimming Lengths feature outlined previously to avoid overlaps.*

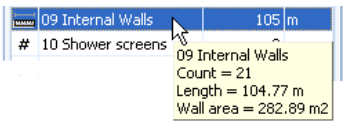
4.39. Use ***Combining Lengths*** measurement (holding the Ctrl key) to **measure** over **walls** with openings, or to combine multiple wall lengths into one measurement.

4.40. To measure the curved wall, **first click** on the **adjacent straight wall**. Then, holding down the **Ctrl** key, **click and drag** the **mouse** cursor **around the curve**. This is effectively using the *Combining Lengths* method to add each curve segment into one length.

Once measurement is complete, your screen should look like this:



4.41. **Move and hold the cursor** over the **{ 09 Internal Walls }** dimension group. An information box will open outlining all of the measured quantities.



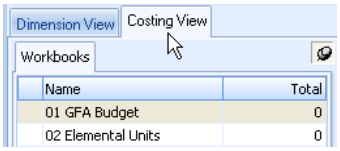
Elemental Units Measurement

Having completed the elemental unit measurement, the 00 Elemental Units folder Dimension Group quantities should look like this. The length of 09 Internal Walls dimension group may vary slightly depending on whether you clicked around the outside or inside face of corners.

00 ELEMENTAL UNITS		
01 Footprint	374	m2
05 Roof	408	m2
07 Windows	33	m
08 External Doors - dou	1	no
08 External Doors - rolle	5	m
08 External Doors - sing	2	no
09 Internal Walls	105	m
10 Shower screens	2	no
11 Internal Doors - singl	12	no
15 Functional Units	1	no
17 Sanitary Fixtures	10	no

Elemental Units Workbook (PFC 3-4)

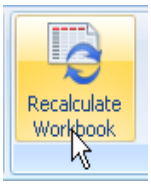
It is not normally necessary, but for the purposes of this exercise ensure all dimension groups have been completed before commencing this section.



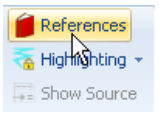
4.42. Firstly **click** the **[Costing View]** tab to switch to the workbooks. **Click** on the **[02 Elemental Units]** title to open the workbook which was copied in from the template and has already been setup with live-links to the Dimension Group quantities.

4.43. The rates for each item have been linked to a rate library. To select a rate library **click** on the **[Properties]** button on the **[Workbooks]** ribbon, or double click on the workbook name.

4.44. In the **[Workbook Properties]** window **open** the drop-down menu for **[Default Rate Library:]** and **select** the **Elemental Template Rates** library imported earlier. **Click [Update]**.



4.45. **Click** the **[Recalculate Workbook]** button to update live-links and refresh the workbook. A warning window will appear advising of invalid Dimension Group references. In this instance Dimension Groups relating to multi storey buildings have been deleted but are still referenced in the Workbook. **Click [OK]** to close the window.



4.46. **Click** on the **[References]** button. A window will appear outlining Unused Dimension Groups (measurements have been taken but not utilised in the Workbook), Used Dimension Groups (giving cell references for each use), Unknown Formula References (formulas that refer to invalid sources) and Zeros (formulas entered that give a result of zero). This information can be copied and pasted into other programs such as Word or Excel®, or into the User columns of the Workbook.

4.47. **Click [OK]** to close the References Report window.

The 02 Elemental Units workbook, copied from the imported template and live-linked to Dimension Groups copied in from the template, has now been completed based on elemental measurements.

Module 5: Detailed Estimate

As noted earlier, measurement in CostX® can be made quicker by re-using the same Dimension Groups for multiple items in the workbook. Instead of having separate Dimension Groups for each type of floor finish, wall finish, ceiling finish, skirting and coving say, you might simply establish Dimension Groups containing a Default Height, based on room type. Then, by clicking around the perimeter of each room you will not only measure its area (floor finish, ceiling finishes), you will also capture the perimeter (skirting, coving), wall area (wall finishes), and even the room volume (air-con). All of this information will be captured by measuring each room once only.

In Module 5 we shall create Dimension Groups based on differing specifications for each room type (as outlined in the square brackets below) and measure each room once. From these single measurements we shall replace the GFA based finishes items within the Elemental Unit workbook with multiple items of different unit of measure then create and use a Rate Library to price them.

Measuring Areas – Line Mode (Vector)

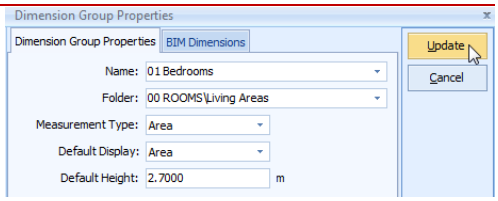
- ***Standard*** – click on perimeter of area to define its borders, click once at every change of direction and press enter or right click to complete the area.
- ***Quickpoint*** – press and hold the Shift key to measure a rectangular area.
- ***Quickpoint Combining Areas*** (for irregular-shaped area) – press and hold Shift key to measure area 1, press and hold Control key (do not release Shift key) and click to measure adjacent area(s) – the areas will be combined.
- ***Polyline*** – press and hold L key whilst holding the cursor over the perimeter of an area. If a polyline is available, the area will be highlighted blue. Click once to capture the area.

Specification Based Dimension Groups

5.1. **Click** the **[Dimension View]** tab and **add** the following new **Dimension Groups** into a new **folder** called "**00 ROOMS**", all with a **[Measurement Type:]** and **[Default Display:]** of **Area** and **[Default Height:]** of **2.70**m. Use the Positive Colour: drop-down menu to select a different colour to shade each measured area.

01 Bedrooms	[carpet, timber skirting, plasterboard walls & ceiling]
02 Living Rooms	[carpet, timber skirting, plasterboard walls & ceiling, plaster coving]
03 Kitchen	[tiled floor, plasterboard walls & ceiling]
04 Corridors	[tiled floor, timber skirting, plasterboard walls & ceiling]
05 Bathrooms / Wet Areas	[tiled floor, tile skirting, moisture-resistant plasterboard walls & ceiling]
06 Garage / Store	[sealed concrete floor, plasterboard walls & ceiling]

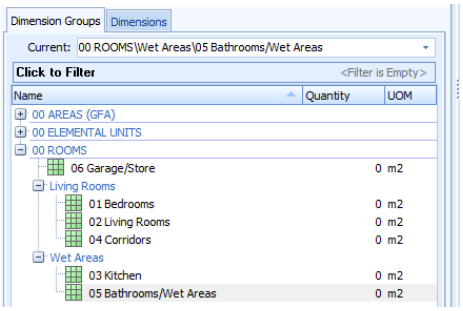
5.2. Once the Dimension Groups have been created, **double-click** the **{ 01 Bedrooms }** Dimension Group to open **{ Dimension Group Properties }** window



5.3. Enter "**\Living Areas**" next to Folder: name as shown and **Click [Update]**. This will create a subfolder **{ Living Areas }** under **00 ROOMS** folder.

5.4. **Repeat** this process the for **{ 02 Living Rooms }** and **{ 04 Corridors }** dimension groups.

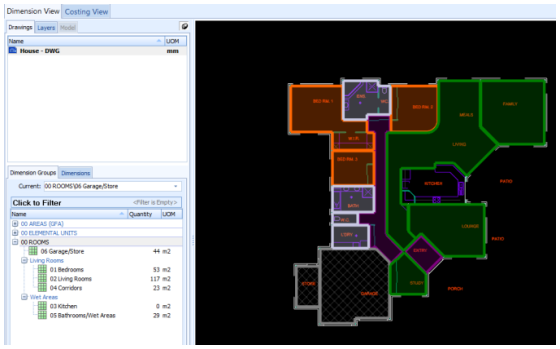
5.5. Similarly create a subfolder called **{ Wet Areas }** for **{ 03 Kitchen }** and **{ 05 Bathrooms/Wet Areas }** Dimension Groups.



5.6. Once the Dimension Groups have been created, **select and invert** the **external walls**, (A-G251-G-WALLEXTL and A-Z005-H-BWK), **internal walls** (A-G252-G-WALLINTL and A-F1-G-ZONE) and **fittings** (A-G4-G-FITT) layers.

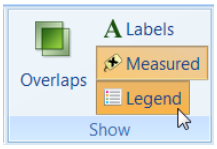
5.7. **Include** the **room name text layer** by **holding** the **T** key whilst highlighting the text. This will make it easier to measure the room areas unimpeded.

5.8. As previously mentioned this drawing has a number of polylines which can be utilised to measure some of the gross room areas. **Measure** the **gross room areas** of **01 Bedrooms and 02 Living Rooms** (i.e. ignoring fittings) using a combination of the *Polyline*, *Standard* and *Quickpoint* methods.

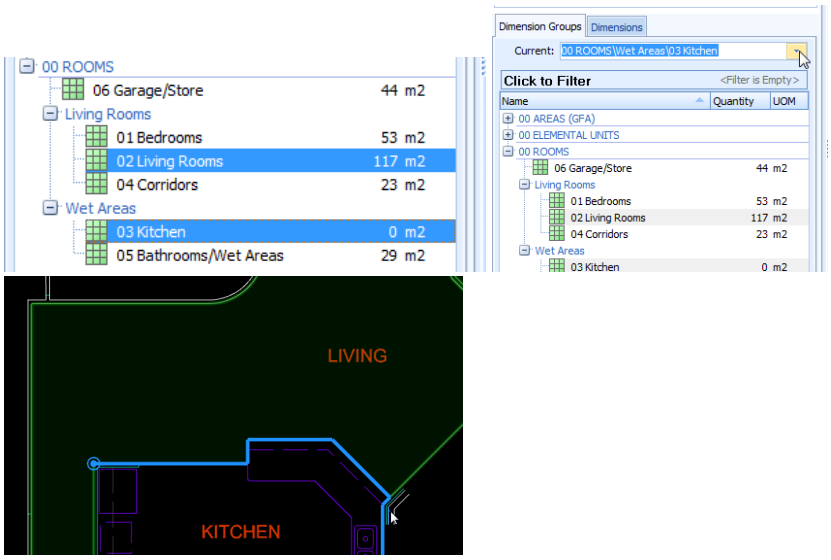


- *You can check progress at any time by clicking on the 00 ROOMS folder name to highlight measurements taken in all Dimension Groups within that folder.*

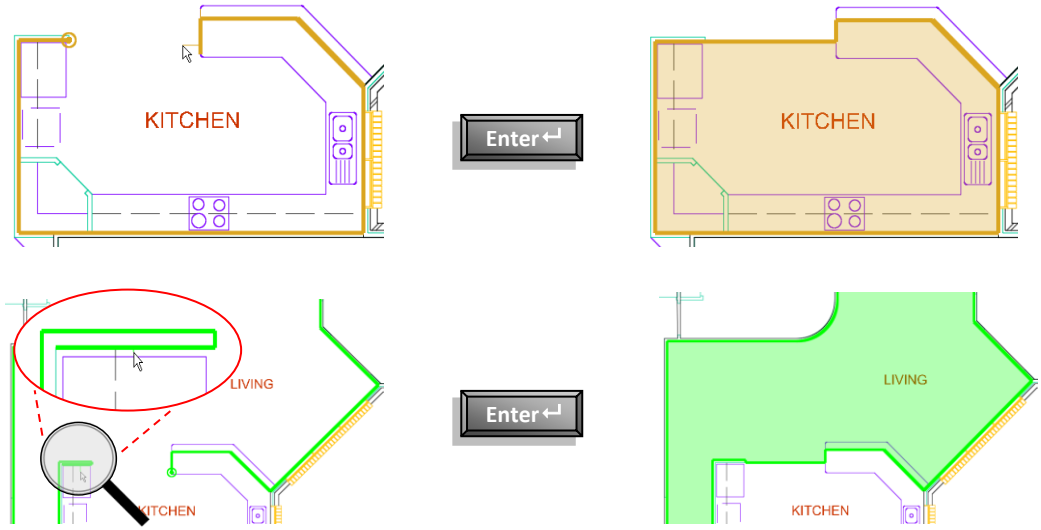
- *This visual check can be accompanied by a Legend accessible via the Dimensions Ribbon, note that the Legend also contain Primary Quantities.*



5.9. Measurements can be made whilst multiple Dimension Groups have been selected, we shall use this function to differentiate the measurement between the Kitchen and Living Area. **Select { 03 Kitchen }** and **{ 02 Living Rooms }** Dimension Groups **using** the **CTRL** key. Note the Dimension Groups Selected will now be Bold, further the Dimension Group to be measured into can be selected from the [**Current:]** Option:



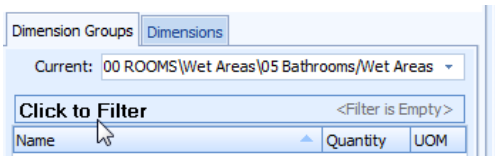
To **measure** the **Kitchen** separately from the Living and Meals area, the ***Standard*** **measurement method** can then be used to delineate the two areas as it can span openings and even use lines pointing the 'wrong' way for alignment (see below). curve.



5.10. Ensure the remaining Areas have been measured to the appropriate dimension groups before continuing.

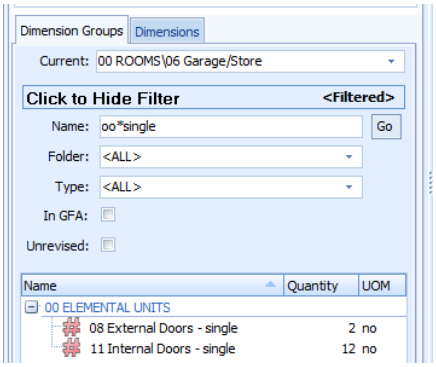
Dimension Group Filter

5.11. On some projects there may be a large number of Dimension Groups. To make them easier to manage, they may be filtered. **Click** on the **[Click to Filter]** function above the Dimension Groups.



5.12. In the **[Name:]** field **type** an individual Dimension Group name and **click [Go]**.

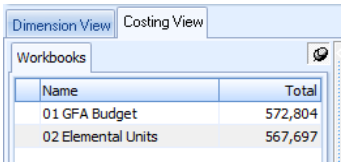
> *Alternatively, star (*) can be used as a wildcard to show a number of Dimension Groups i.e. typing oo*single will return all Dimension Groups with 'oo' and 'single' somewhere in the name. You may need to open folders to see their filtered contents. The Folder: or Type: drop-down menus may also be used to filter by.*



5.13. To re-show all Dimension Groups, **clear** any **filter criteria** then **click [Go]**.

5.14. To hide the filter criteria fields from view **select [Click to Hide Filter]**.

Detailed Estimate



5.15. **Click** the **[Costing View]** tab then **click** on the **{ 02 Elemental Units }** title to open the workbook.

5.16. **Double click** on the **Floor Finishes** element **[F:Subtotal]** cell, or row number heading (13), to drill down to Level 2 in the workbook. This contains an allowance based on GFA which we shall now replace with detailed estimate items derived from the room areas measured previously.

5.17. Firstly, simply **select** the **{ 06 Garage / Store]** dimension group from the **{ 00 ROOMS]** folder and drag and drop it into the **B:Description** cell on any of the spare rows.

5.18. In the **[Add Quantity]** window over-type the **Description:** to read, "**Sealed finish to concrete floor**". **Enter** a suitable **[Rate:]** and **click [Update]** to create an estimate item.

> *Note that the quantity is green denoting a live-link to the Dimension Group.*

5.19. Next, in the **[B:Description]** column, **enter** a suitable **description** for carpet then **double click** on the adjacent **[C:Quantity]** column to open a Qty sheet. Use the Shift or Ctrl keys to **select both** the **{ 01 Bedrooms }** and **{ 02 Living Rooms }** dimension groups and drag-and-drop them simultaneously into the **[D:Length]** column of the Qty sheet. In the **[Add Quantity]** window **click [OK]**.

5.20. **Click** on the **button** to return to the Cost sheet at Level 2 and **enter** a **[D:Unit]** (m^2) and **[E:Rate]** for the carpet to complete the estimate item.

5.21. Using the latter method, **create an estimate** item for floor tiling using the **{ 03 Kitchen }** and **{ 04 Corridors }** and **{ 05 Bathrooms / Wet Areas }** dimension groups in the Qty sheet build-up.

5.22. **Select** the three new floor finishes items in the **[C:Quantity]** column. The total quantity is shown in the bottom right of the screen (≈285m^2), allowing comparison with the FECA dimension group (290m^2 including partition wall footprint).

Deductions for Openings in Workbook

5.23. Next, in column **[B:Description]**, **enter** a **timber skirting** item.

5.24. **Double click** on the **[C:Quantity]** cell.

5.25. From the **{ Living Areas }** subfolder **select** the **{ 01 Bedrooms }**, **{ 02 Living Rooms }** and **{ 04 Corridors }** dimension groups and **drag-and-drop** them into the **[D:Length]** column. When the **{ Add Quantity }** window appears **select** the **{ Length }**: option button and **click [OK]**. The perimeter of each room area measured in those Dimension Groups is inserted into the Qty worksheet.

> *Adjustments for openings can be made based on a combination of quantities from varying Dimension Groups as available. In this example, we shall use the external and internal door counts to delete door openings from the timber skirting length. This will, however, create an over deduction for the bathroom / wet area doors where there are tile skirtings. We shall therefore add these openings back based on the number of rooms of that type.*

5.26. Still in the Qty sheet drag and drop the **{ 08 External Doors – double }** dimension group from the **{ 00 Elemental Units }** folder into the **[C:Count]** column and **click [Update]**. **Enter** the width of the door as a negative value, **-1.80**, in the **[E:Width]** column to create a deduction in the skirting length.

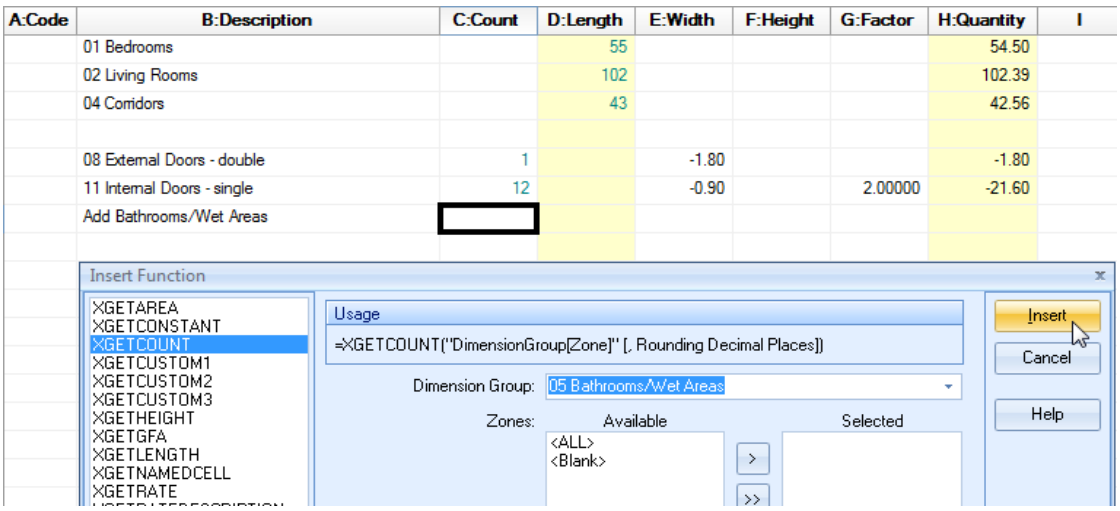
5.27. **Repeat** this process **dragging** the **{ 11 Internal Doors – single }** dimension group into the **[C:Count]** column and **clicking [Update]**. **Enter -0.90** in the **[E:Width]** column. **Enter "2"** in the **[G:Factor]** column to deduct skirting from both sides of the internal door openings.

5.28. In the next row **enter** a **[B:Description]** relating to adding back the Bathroom / Wet Area doors and type a **[E:Width]** of **+0.90**.

5.29. In the **[D:Length]** column **click** on the Function button (or click the right mouse button and select Insert Function).

5.30. In the **[Insert Function]** window **select [XGetCount]** from the list at the left hand side (see below) and then use the **[Dimension Group:]** drop-down menu to **select { 05 Bathrooms / Wet Areas }**. **Click [Insert]**.

5.31. The number of bathrooms (equating to their number of doors) will be entered in the **[D:Length]** column completing the adjustment.



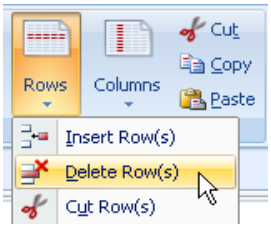
5.32. **Click** on the **button** to return to the Cost sheet at Level 2 and **enter** a **[D:Unit]** (m) and **[E:Rate]** for the timber skirting to complete the estimate item.

5.33. **Repeat** this process to create a **tile skirting** estimate item

> *Enter a B:Description for tile skirting then double click on the C:Quantity cell. Drag-and-drop the 05 Bathrooms / Wet Areas dimension group into the D:Length column using the Quantity Type: of Length to create a linear measure. On a new line enter a E:Width of -0.90 and in column D:Length insert a XGetCount function referring to the 05 Bathrooms / Wet Areas dimension group.*

5.34. Return to the Cost sheet at Level 2 and **enter** a **[D:Unit]** (m) and **[E:Rate]** for tile skirting.

5.35. **Click** on the original **GFA allowance lines**. As these have now been replaced by measured items, **click** the **[Rows]** button in the ribbon and **select [Delete Row(s)]**.



> *Alternatively, holding the Ctrl and Delete keys will delete the rows.*

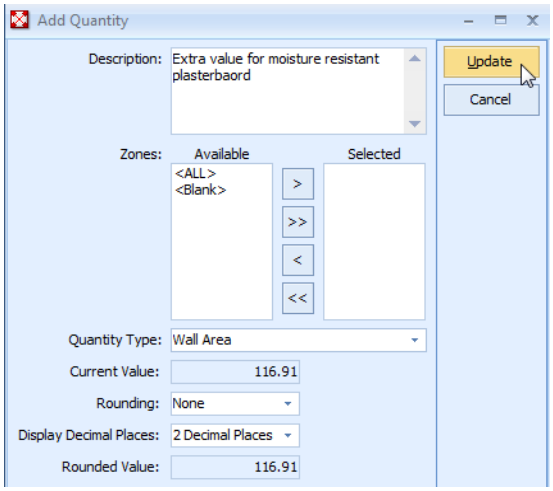
5.36. **Click** on the **button** to return to Level 1 of the workbook.

Estimate with different Quantity Type

5.37. **Double click** on the Wall Finishes element **[F:Subtotal]** cell, or row number heading (12), to drill down to Level 2 in the workbook. This contains a single item based on the external and internal wall areas with deductions for window and door openings.

5.38. **Drag and drop** the **{ 05 Bathrooms / Wet Areas }** dimension group into the **[B:Description]** cell on any of the spare rows.

5.39. In **[Add Quantity]** window, over-type the **[Description:]** to read "**Extra value for moisture resistant plasterboard**." Use the drop-down menu to **select** a **[Quantity Type:]** of **Wall Area**.



Note that the Rounded Value: field displays the result of multiplying the room perimeters by the Default Height and the Rounding: field can be used to set the required rounding.

5.40. **Enter** a **[Rate:]** and **click [Update]**. A new item relating to the Bathroom / Wet Areas wall area (measured over openings) will be entered into the workbook.

It is now possible to see how simple room related Dimension Groups can be used to provide differing measurements in multiple locations throughout the workbook. This 'one-to-many' principle can save a lot of measuring time.

5.41. **Click** on the **button** to return to Level 1 of the workbook.

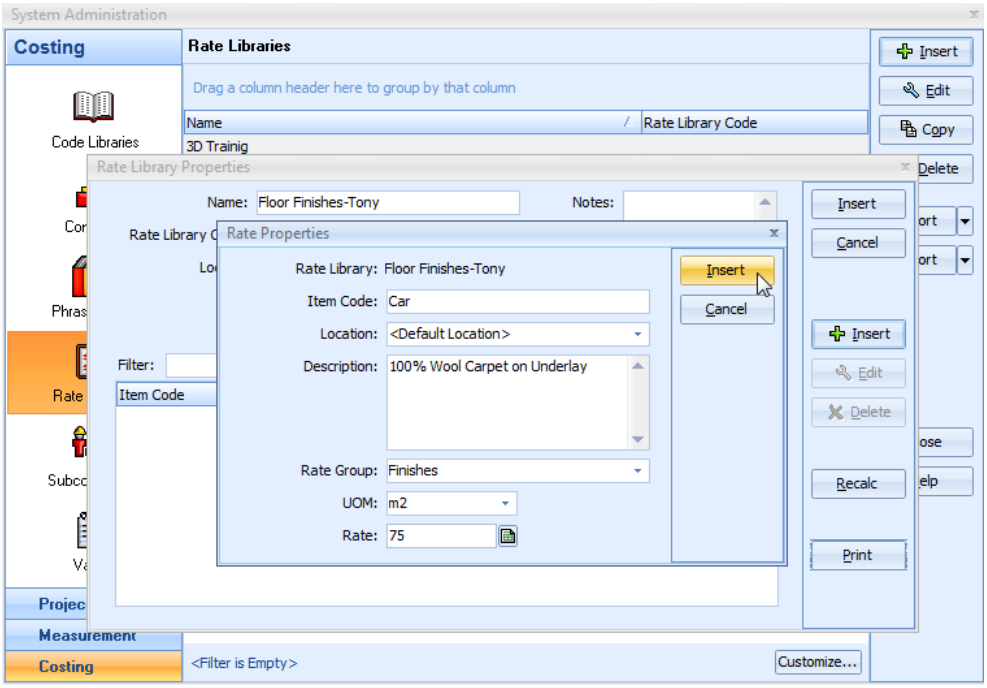
Creating and Using Rate Libraries (PFC 3-3)

5.42. From the **[Main Menu]** open **[System Administration]**. **Click** on the **[Costing]** button at the bottom left then **select** the **[Rate Libraries]** folder. **Click** the Insert button.

5.43. **Enter** a **[Name:]** for your library of **"Floor Finishes-"** followed by your name then **click** the Insert button to add rate library items.

5.44. **Complete** all fields in the **[Rate Properties]** window (see below) then **click** Insert to save your rate library item for carpet floor finish.

> *Note that the Location: must be the same as for your Project, in this case <Default Location>. Also, clicking the button adjacent to the Rate: field opens a calculation sheet in which items from other rate libraries can be referenced*



5.45. In the **[Rate Library Properties]** window **use** the Insert **button** to add further rate items for sealed concrete and ceramic tile floor finishes. Each item must have a unique Item Code:

5.46. Use the ⊞ **button** to view a list of your rate library items then **click** Insert to save the new rate library.

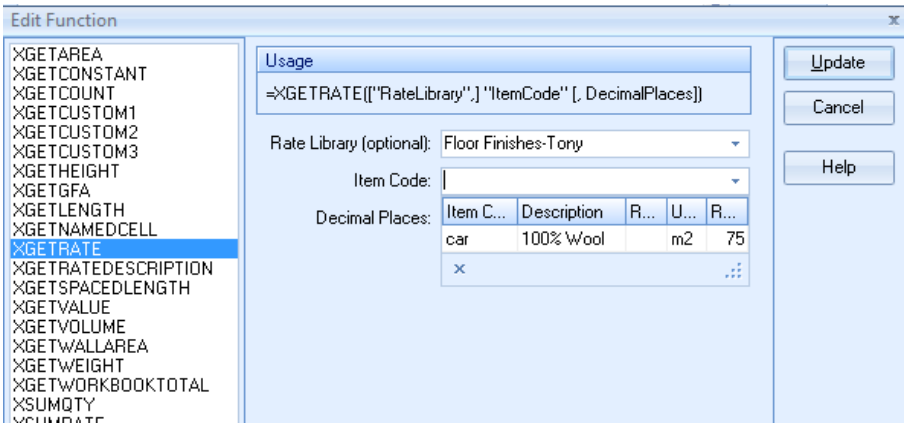
5.47. **Click** the **[Close]** button to exit **[System Administration]**.

Using a Rate Library

5.48. **Double click** on the **Floor Finishes** element **[F:Subtotal]** cell to drill down to workbook Level 2.

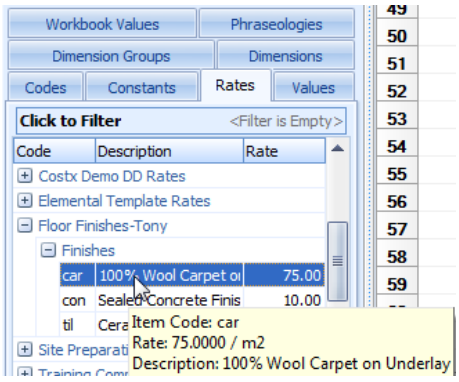
5.49. On a new row **select** a cell in the **[E:Rate]** column. Then, either **click** the **[Function]** button on the Workbooks ribbon or **click the right mouse** button and **select [Insert Function]**.

5.50. In the **[Edit Function]** window **select [XGetRate]** and use the drop-down menus to **choose a library** item from the **'Floor Finishes-Your Name'** library just created. **Click [Update]** and an estimate item complete with Code, Description, Unit of Measure and Rate will be created in the Workbook.



5.51. **Double click** on the **[C:Quantity]** cell to **drag-and-drop** quantities from the **{ 00 ROOMS }** dimension groups as previously then **click** on the **button** to return to Level 2 of the workbook. A priced estimate item, live-linked to Dimension Groups (Qty sheet) and a Rate Library, is completed.

5.52. **Click** on the **[Rates]** tab in the Dimension Group window. Use the **button** to open the 'Floor Finishes-Your Name' rate library then click to **select a rate** in the list. **Drag-and-drop** the rate item into the workbook.



> *Dropping it into the E:Rate column only populates the rate cell, whilst dropping it in the B:Description column creates a complete estimate item (excluding quantity). Note that the E:Rate figure is green, denoting a live link.*

5.53. Click on the E:Rate cell and then click the Show Source button in the Workbooks ribbon menu.

5.54. In the **[Rate Properties]** window **amend** the **Rate:** figure and **click [Update]**.

> *The rate figure in the Rate Library to the left, and in every instance in the Sheet in view, will be revised accordingly, however for the update to be across the Workbook, select the Recalculate Workbook button in the Workbooks ribbon.*

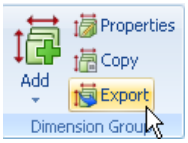
5.55. **Click** on the **button** to return to Level 1 of the workbook.

Module 6: Reports

In Module 6 we shall look at how to export information from CostX® to Excel®, how to generate reports from existing templates and how to create and edit your own report templates. In this we shall look at selecting what data appears on the report and how it is grouped, amending the page layout and adding a logo, and how to preview, save and filter your report.

Exporting Dimensions to Excel® (PFC 4-1)

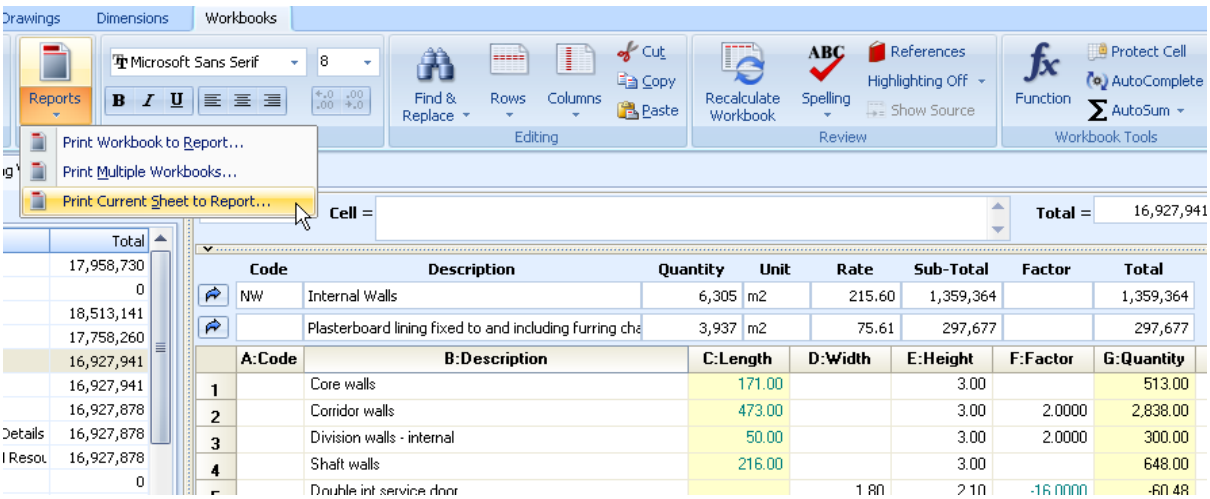
6.1. CostX® can export Dimensions to Excel®. To export Dimensions, use the **[Export]** button on the **[Dimensions]** ribbon. The Dimensions are scheduled drawing by drawing on individual Excel® worksheet tabs, with a separate Summary by Drawing, and overall Summary.



Print Current Sheet to Report (PFC 4-2)

6.2. Sometimes a hard copy of a particular CostX® workbook sheet is required e.g. a copy of a quantity or rate build-up, or a list of dimensions. To obtain this open the required sheet and use the **[Print Current Sheet to Report]** option on the **[Reports]** button drop-down menu.

6.3. In **[Print Current Sheet]** window, **Click [Preview]**.

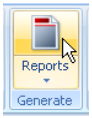


Generating Reports in CostX® (PFC 4-3)

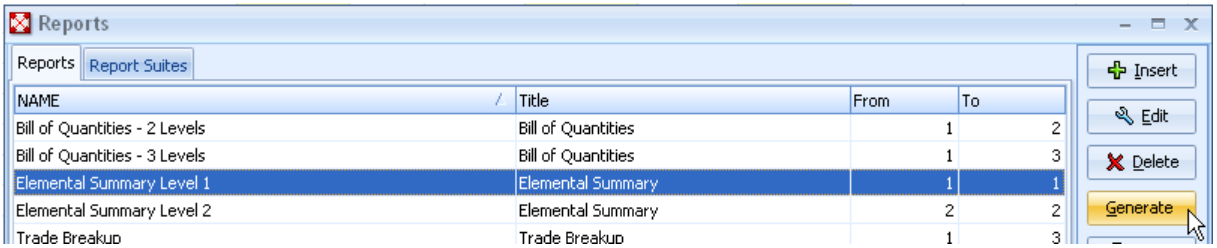
CostX® is supplied with a number of pre-prepared standard report templates which may also be edited to suit each organisation's individual requirements. CostX® has three types of report, namely "Standard", "Custom" and "System". The format and configuration of these reports is managed by two separate and discrete report writers.

The "Standard" Report Writer allows default Standard reports shipped with CostX® to be edited to suit user requirements as described in the following examples. The Custom Report Writer is not addressed in this training exercise. For more information refer to the CostX® Custom Reports Guide.

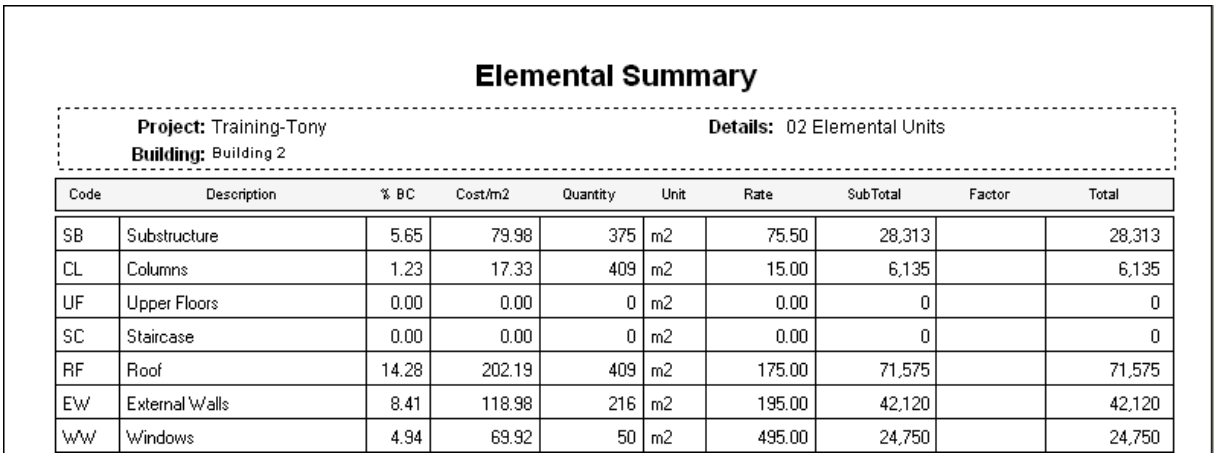
6.4. Ensure that the **{ 02 Elemental Units }** workbook is open then **click** the **[Reports]** button on the **[Workbooks]** ribbon. If the drop-down menu opens **click [Print Workbook to Report]**.



6.5. **Select** the **{ Elemental Summary Level 1 }** report and **click [Generate]**.



6.6. A **[Generate Report]** window will appear allowing certain details to be amended and printer options to be selected. **Click [Preview]** to view the report which should look similar to below.



Elemental Summary

Project: Training-Tony **Details:** 02 Elemental Units
Building: Building 2

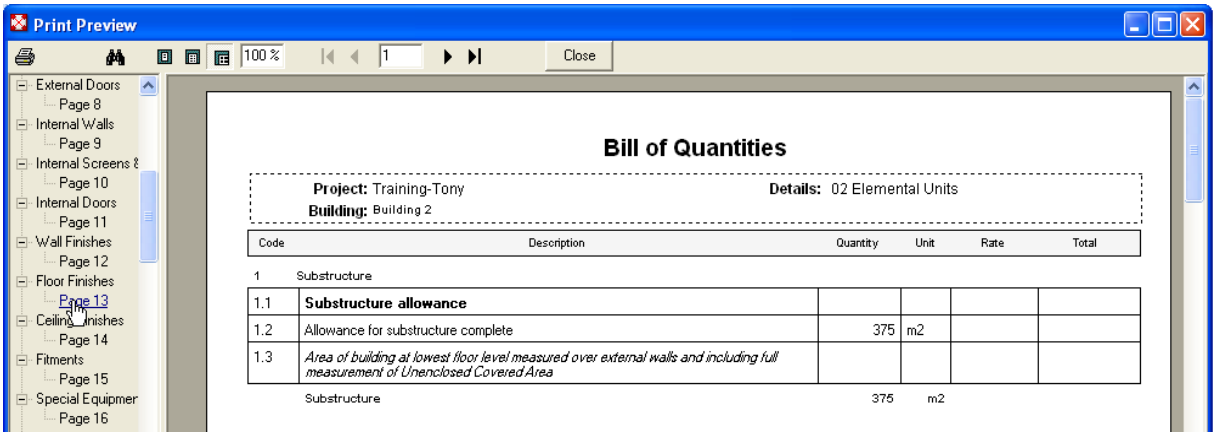
Code	Description	% BC	Cost/m2	Quantity	Unit	Rate	SubTotal	Factor	Total
SB	Substructure	5.65	79.98	375	m2	75.50	28,313		28,313
CL	Columns	1.23	17.33	409	m2	15.00	6,135		6,135
UF	Upper Floors	0.00	0.00	0	m2	0.00	0		0
SC	Staircase	0.00	0.00	0	m2	0.00	0		0
RF	Roof	14.28	202.19	409	m2	175.00	71,575		71,575
EW	External Walls	8.41	118.98	216	m2	195.00	42,120		42,120
WW	Windows	4.94	69.92	50	m2	495.00	24,750		24,750

6.7. **Click** the **[Close]** button to exit from the print preview screen.

6.8. In the **[Reports]** window **click** on the **{ Bill of Quantities – 2 Levels }** report to select it. **Click [Generate]** to open the **[Generate Report]** window, and then **[Preview]** to view the report.

Note the different report layout even though it is derived from the same workbook.

6.9. Use the navigation pane on the left hand side to preview the **Floor Finishes** page.



> *All of the items entered into the workbook in the previous exercise will be included on the report however no Rates or Totals are shown, despite these being included in the workbook. This is as a result of this particular report having been set to print an un-priced Bill of Quantities.*

6.10. **Click [Close]** to exit from the **[Print Preview]** screen, and **[Close]** again to exit from the list of available reports.

> *Note that by opening the 01 GFA Budget workbook and then clicking the Reports button, a similar process can be followed to generate reports from this workbook.*

Copying Reports

> *When editing reports it is important to maintain the original templates and existing bespoke layouts that may already have been created. It is therefore advocated that the report to be edited is first copied, and any revisions made to the copied version, thereby preserving the original.*

6.11. On the **[Workbooks]** ribbon **Click** the **[Reports]** button. If the drop-down menu opens **click** on the **[Print Workbook to Report]** option.

6.12. **Select** the **'Elemental Summary Level 1'** report that was previewed previously then **click** the **[Copy]** button.

6.13. In the **[Insert Report]** window, enter a **[Name:]** of "Elemental Summary-" followed by your name for the new report.

6.14. In the **[Workbook Data]** section, leave the **[From Level:]** as **1**, and use the drop-down arrow to amend the **[To Level:]** selection to **2** and then **click [Next]** to create the copy.

Editing Reports

Having created a copy of the existing report you can now amend this copy, creating a new layout showing the same workbook content in a different format.

6.15. **Click** on your **new report name** to highlight it and then **click** the **[Edit]** button.

6.16. The **[Report Properties]** window will open with the **[Data]** tab selected.

Editing Report Data

This means that information from both levels one and two of the workbook will now appear on the report.

6.17. In the **[Columns]** section there are two fields identifying the columns that are [Available] to be used in the report and those that have been [Selected] to appear. In the **[Selected]** field, **hold down the Ctrl** key and **click** on the **Code, Cost/Unit, Subtotal and Factor columns**. With all four highlighted, **click** on the remove **button** < to exclude them from the list of Selected columns meaning that they will no longer be shown in the report.

6.18. In the **[Available]** field, **click** on the **Autocode** column to highlight it, then **click** on the **add button** > to move it into the **[Selected]** field. **Click** on it again to re-highlight it then use the **Up** button to move it to the top of the list. The **Autocode** column will now be shown in the report, as the first column to the left hand side.

Editing Report Grouping

6.19. **Select** the **[Grouping]** tab at the top and in the **[Grouping]** section, **tick** the option box to show **[One Group/Page:]**

This means that each new group on Level 1 of the workbook (Substructure, Columns, Upper Floors, etc.) will commence printing on a new page.

6.20. Still in the **[Grouping]** section tick the option box adjacent to **[Show Group Number:]** Then, in the **[Numbering]** section at the bottom, use the drop-down menu for **[Group Numbering:]** to select **Letters**.

We have now specified that we wish each group on Level 1 of the workbook (Substructure, Columns, Upper Floors, etc.) to be identified by a letter, and that this should be printed on the report.

Editing the Report Page Layout

6.21. **Select** the **[Page Layout]** tab. This has sections under which the paper size and orientation, and the size of each margin can be set.

6.22. In the **[Grid Lines]** section ensure that the option box to **[Show Vertical Lines:]** is **ticked** then also **tick** the option for **[Full Page Vertical Lines:]**

This specifies that the vertical lines are printed over the full depth of the page, and not just to the bottom of the data shown.

6.23. **Un-tick** the option box for **[Show Horizontal Lines:]** to remove them from the output.

Editing the Report Header

6.24. **Click** on the **[Header]** tab. In the **[Custom Logo]** section, against **[File Name:]** use the browse button to find the CostX®.wmf file in the data set. **Highlight the file** and **click [Open]**.

6.25. Use the drop-down menu to amend the **[Show On:]** setting to **Right**, thereby placing the chosen logo to the right hand side of the report.

6.26. In the **[Layout]** section use the **[Header Layout:]** drop-down menu to choose **Three Column Title Only**. Three fields will open up in the **Report Title** section beneath.

6.27. **Delete** the **text** in the **[Left Title:]** field and replace it with **%WORKBOOK%**. This is a Report Keyword (in this case referring to the workbook name) a list of which can be found in the Help.

6.28. In the **[Centre Title]** field **enter** the Report Keyword **%BUILDING%** which will place the building name in the centre of the report header.

6.29. In the **[Fonts]** section, change the **[Page Header:]** and **[Group Header:]** text sizes to **10pt**.

Editing Column Data

6.30. **Click** on the **[Columns]** tab and open **[Column:]** drop-down the menu at the top. You will notice that the list includes all of the columns selected to appear in the report earlier in this exercise. This tab allows you to control how each of those selected columns are configured to behave.

6.31. **Select** the **[Autocode]** column and note that the **[Column Heading:]** field contains the Report Keyword **%COLUMNHEAD%** taking the column heading from the workbook onto the report.

6.32. **Delete** the **keyword** and **type** in "**Ref.**" as the text to appear in the Autocode column heading.

6.33. In the **[Column Data Options]** section use the **[Code Format:]** drop-down menu to **select <Group>.<Number in Group>** as the preferred **Autocode** option.

6.34. Now, use the **[Column:]** drop-down menu at the top to **select** the **Quantity** column.

6.35. Note that the Column Data Options section now has only two settings to control. **Use** the **[Show Zero As:]** drop-down menu to set your preferred method of displaying zero quantities.

6.36. Now, use the **[Column:]** drop-down menu at the top to **select** the **Rate** column. In the **[Column Data Options]** section **un-tick** the option box for **[Show Column Data:]** This means that, even though rates exist in the workbook they will no longer be shown on the report.

6.37. Use the **[Column:]** drop-down menu at the top to select the **Total** column. In the **[Column Footer Options]** section first **un-tick** the **[Show in Summary]** option box then, in the **[Column Data Options** section, **un-tick** the **[Show Column Data]** option. These settings will print an un-priced document.

Editing the Report Footer

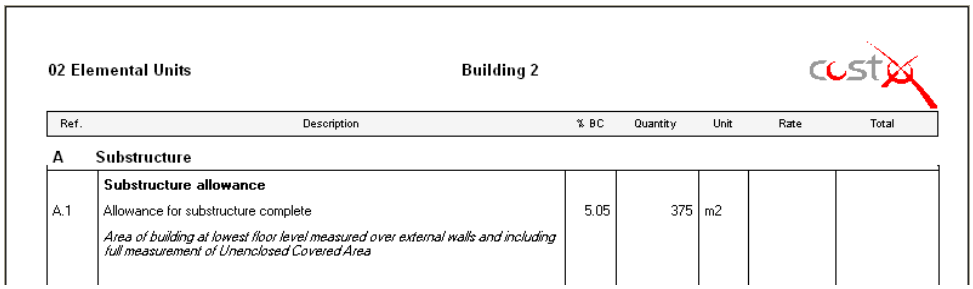
6.38. **Click** on the **[Footer]** tab and note the Report Keywords already entered into the three Text section fields.

6.39. In the **[Fonts]** section set the **[Page Footer:]** font size to **8pt**.

Previewing, Saving and Generating the Report

> *The amended layout can be viewed at any time by clicking the Preview button however changes are not saved until the Update button is clicked.*

6.40. **Click** the [**Preview]** button to compare your new layout to the original (see section 6.3 above) that was copied and edited. **Close** the preview and **click [Update]** to save your changes.



02 Elemental Units — Building 2

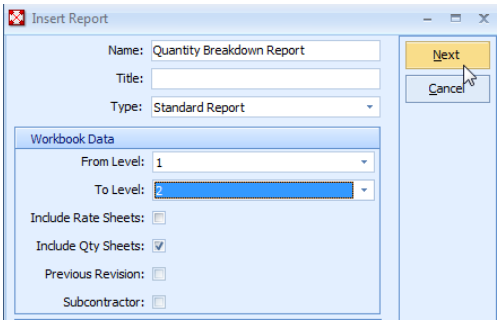
Ref.	Description	% BC	Quantity	Unit	Rate	Total
A	**Substructure**					
	Substructure allowance					
A.1	Allowance for substructure complete	5.05	375	m2		
	Area of building at lowest floor level measured over external walls and including full measurement of Unenclosed Covered Area					

6.41. In the Reports window ensure that the new report remains highlighted then **click** the **[Generate]** button. A **[Generate Report]** window appears outlining some of the report settings allowing them to be changed. Changes made here (as opposed to in Edit mode) are temporary and revert back to the original setting when the Building is closed.

6.42. In the **[Filter By:]** field **leave** the **A:Code** column **selected** and **tick** the **[Use]** option box. In **[Codes to Show:]** enter **FF** (the text in A:Code row 13 of the workbook) and **click [Preview]**. A report will generate showing only the Floor Finishes section. **Close** back to the Workbook.

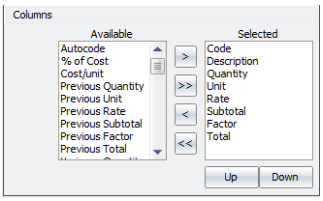
Creating a New Report

Next we will create a Quantity Breakdown Report to show any calculations carried out in the quantity sheets. We will utilise the settings covered in the previous section.



6.43. **Click** on the **[Reports]** button in the **[Workbooks]** tab, and when the **[Reports]** window opens **select** the **[Insert]** button. **Name** it "**Quantity Breakdown Report"**.

6.44. **Select levels 1 to 2** for the **[Workbook Data]** section, and ensure the **[Include Qty Sheets]** box is **ticked**. Ensure the selected columns reflect the image to the right.



6.45. **Click [Next]** to create a new report

6.46. In **[Report Properties]** window, **Click** on the **[Grouping]** tab and select **[One Group/Page]**, this will show each element on a new page.

6.47. Next in the **[Header]** tab, **select** the layout **[Single Title Only]** and **call** the report **"Quantity Breakdowns"** and align the text to **[Shown On] Center**.

6.48. In the next tab **[Columns]** change the settings for the columns in the workbook as follows:

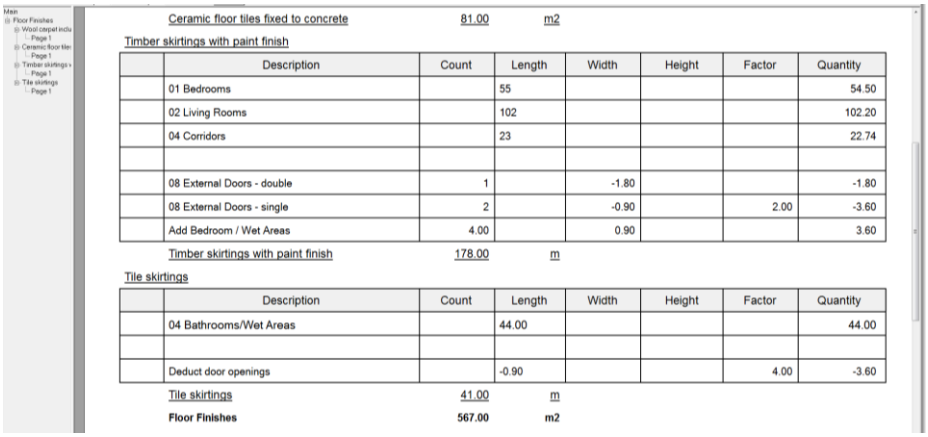
Code – Ensure **[Show in Group Footer]** is **ticked**

Description – Ensure **[Show in Group Footer]** is **ticked**

Quantity – Ensure **[Show in Group Footer]** is **ticked**, and **select [Workbook Value]** for **Group Footer Value**

Unit – Ensure **[Show in Group Footer]** is **ticked**

6.49. **Select** the **[Insert]** button once the setting above have been adjusted, then **select** the **{ Quantity Breakdown Report }** from the list of Reports and **select [Generate]**, In the **[Filter By:]** field leave the **A:Code** column selected and **tick the Use** option box. In **[Codes to Show:]** enter "**FF"** (the text in A:Code row 13 of the workbook) and **click [Preview]**. A report will generate showing only the quantity breakdown for Floor Finishes section.



Ceramic floor tiles fixed to concrete 81.00 m2

Timber skirtings with paint finish

	Description	Count	Length	Width	Height	Factor	Quantity
	01 Bedrooms		55				54.50
	02 Living Rooms		102				102.20
	04 Corridors		23				22.74
	08 External Doors - double	1		-1.80			-1.80
	08 External Doors - single	2		-0.90		2.00	-3.60
	Add Bedroom / Wet Areas	4.00		0.90			3.60

Timber skirtings with paint finish 178.00 m

Tile skirtings

	Description	Count	Length	Width	Height	Factor	Quantity
	04 Bathrooms/Wet Areas		44.00				44.00
	Deduct door openings		-0.90			4.00	-3.60

Tile skirtings 41.00 m

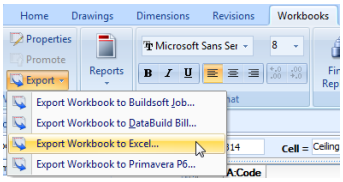
Floor Finishes 567.00 m2

Module 7: External Data & System Administration

As well as being able to export and import files created in CostX® you may also export to, and import from, files prepared in a number of external applications. This is the case for both Workbooks and various aspects of System Administration. We have already worked in System Administration in earlier exercises to create a Rate Library. In Module 7 we shall review the alternative Workbook import options, before copying an Excel® workbook into our building then review the various System Administration entities and their import and export availability.

Workbook Exports and Imports

7.1. **Click** the **[Export]** button on the **[Workbooks]** ribbon. To enable Buildsoft, DataBuild, and Primavera P6 users to view and amend Workbooks prepared in CostX® options exist to export in these formats, as well as the ability to export to Excel®.



In Excel® the Workbook will be reproduced on a single worksheet tab with the data inserted as static values with no live-link back to the CostX® database. To live-link CostX® data into Excel®, use Exactal's CostXL® software.

7.2. **Click** on the bottom section of the **[Add Workbook]** button to open the drop-down menu. An option exists to import from a Buildsoft Backup File (.e0x).

All data contained in the file can be imported into a CostX® workbook. There is also the option to import UK building cost analyses from BCIS Online, providing access to over 16,000 building models and associated cost and tender information. The building models are available on a subscription basis and can be downloaded to an XML file. CostX® also supports importing building models with cost breakdowns from CXF files. These are available on a subscription basis from CostWeb and are created by exporting the online information directly to a CXF file.

7.3. From the drop-down menu select **[Add Workbook]**.

7.4. In the **[Workbook Properties]** window enter a **[Name:]** for your workbook such as "**03 Excel® Import**" and **click [Insert]**.

7.5. **Start Excel®** on your computer and **open** the **{ Residential Workbook.xls }** file from the training dataset.

7.6. On the **[Summary]** tab of the **Excel® Workbook highlight cells A2:D34** then, hovering over the highlighted cells, **click** the **right mouse** button and **select [Copy]**.

7.7. **Click** on the  **button** in the **Taskbar** at the bottom of the screen to switch back to CostX®. **Click** the **right mouse** button over cell **A1** of the CostX® Workbook and **select [Paste]**. The Excel® Summary worksheet is copied into your new CostX® Workbook.

7.8. **Click** on the  **button** in the **Taskbar** at the bottom of the screen to re-activate Excel® then **click** on the **{ E01 Site }** worksheet tab to open it. **Highlight cells A5:E16** and, hovering over the highlighted cells, **click the right mouse** button and **select [Copy]**.

7.9. Switch **back to CostX®** and **double click** on the **[F:Subtotal]** cell on the same row as the **{ Site Preparation }** heading (F2) to **open** the **Level 2** Cost sheet. **Click** the **right mouse** button in cell **A2 of the CostX®** Workbook then **select [Paste]**.

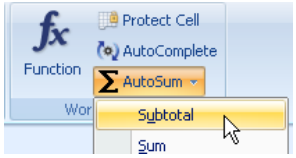
> *Note that formatting from Excel® is carried into CostX® and that formulas are automatically entered in rows F:Subtotal and H:Total*

7.10. **Click** on the  **button** to return to Level 1 of the workbook. The total of the Site Preparation element is entered against the Level 1 heading.

7.11. **Repeat the process** to copy and paste further Excel® worksheets to their respective Level 2 workbook in CostX®.

7.12. Having copied in a number of elemental sections, **click** on the **[H:Total]** column on the same row as the Construction Total heading on Level 1 in CostX® (H27). **Hold down the left mouse** button and **drag the cursor** to **highlight cells H27 up to H1**.

7.13. In the Workbooks ribbon menu **click** on the **[AutoSum]** button and **select [Subtotal]** from the drop-down menu. The value of all figures in the highlighted cells will be subtotalled in the bottom one.



7.14. Next in column **[F:Subtotal]** against the **{ Allowance for Preliminaries }** heading (F29) **enter** the following **formula** to calculate the Preliminaries by percentage, rounded up to the nearest thousand: **"=ROUNDUP(H$27*C29%,-3)"**. Refer to the Help files (Refer to Workbooks > Cell Equations Topics) for information on entering formulas.

7.15. **Click** on the **cell containing the formula** just entered and, holding the left mouse button drag the cursor over the **two cells below (F30 and F31) to highlight** all three. **Hold down the Ctrl** button and **press the D** key to duplicate the formula from the top cell to those highlighted below creating Margin and Contingency values by percentage based on the Construction Total figure.

7.16. **Click** on the **[H:Total]** column against the **{ Estimate Total }** heading (H33). **Hold down** the **left mouse** button and **drag the cursor** to highlight from this cell **up to H1** then use the AutoSum button to enter a **Subtotal** as before.

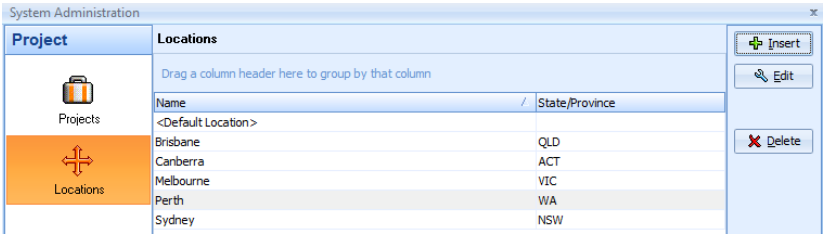
Spreadsheets can be quickly copied into CostX® to take advantage of the additional features offered.

System Administration

System Administration is used to set up or tailor the CostX® system and, as settings applied here are system-wide, changes are seen by all networked users. A Help button is present on the right hand side of all System Administration windows enabling access to further information (Using the System Administration topics) at any time.

Locations

7.17. From the **[Main Menu]** open **[System Administration]** and **click** on the **[Locations]** folder button.



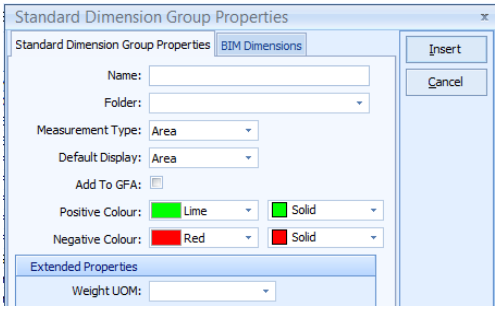
Locations can be established to differentiate prices within a Rate Library.

7.18. To create a list of Locations simply **click** on the **[Insert]** button and complete the fields.

Locations can be established to differentiate prices within a Rate Library. Once established, differing prices can be allocated to differing Locations within a Rate Library. Location: is then set for each Project aligning that Project with the correct set of rates. Applying <Default Location> to items in a Rate Library is akin to a 'global' setting as rates with a <Default Location> can be used on any Project, irrespective of its specified Location.

Standard Dimension Groups

As we have already seen in earlier exercises Dimension Groups can be added ad-hoc as required, or copied into a Building as part of a template. In addition to this a list of Standard Dimension Groups can be created in System Administration and the option set to copy them to each new Building by default.

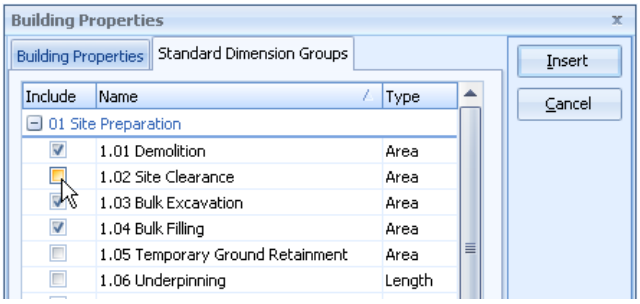


7.19. **Click** on the **[Measurement]** button at the bottom left of the System Administration window, **click** on the **[Standard Dimension Groups]** folder above, then **click [Insert]**. The **[Standard Dimension Group Properties]** window will **open**. The Name; Folder; and Measurement Type: fields, and the Add to GFA: checkbox are the same as when creating Dimension Groups from within a Building.

There is, however, an additional Include By Default: checkbox which, if ticked ensures that the Standard Dimension Group is copied into all new Buildings. Note that if a New Building is created Based On a previous building, The Standard Dimension Groups selected as Include By Default will not be inserted into this new building. There is also a Notes: field which may be completed if desired.

7.20. **Click [Cancel]** to close the **[Standard Dimension Group Properties]** window.

Once Standard Dimension Groups have been created, when a new Building is added and the Building Properties window appears, they will be listed on the Standard Dimensions Groups tab in their respective folders (see below). Depending on the Include by Default setting of each Standard Dimension Group in System Administration the checkbox in the Include column will be set against each one. Ticking or un-ticking these boxes before clicking the Insert button will determine whether or not each Standard Dimension Group is copied into the Building.



Standard Zones

Zones allow Dimensions to be extracted on a per level/unit/story/functional area basis. Zones essentially provide the ability to categorise Dimensions and therefore can even be used to categorise by time (the stage of construction). You can later filter by these zones. In System Administration a list of Standard Zones can be created which are the applied to each new Building. The use of Zones is covered in the Advanced Training course.

Units of Measure

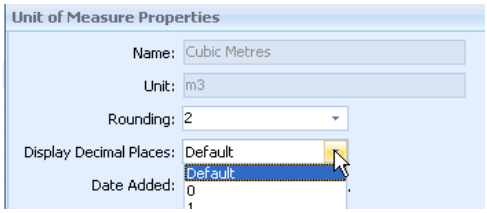
This holds typical abbreviations for units of measurement and allows the calculation and display rounding to be set individually for each one.

7.21. **Click** on the **[Unit of Measure]** folder button.

7.22. **Click** on **any row** to select it and then **click** the **[Edit]** button.

7.23. Using the drop-down menu to set the number of decimal places for **[Rounding:]** will alter the rounding applied when dragging-and-dropping Dimension Groups, and for summary calculations in Workbooks.

7.24. Setting the **[Display Decimal Places:]** alters the default Workbook setting for that Unit of Measure.



7.25. **Click [Cancel]** to close the **[Unit of Measure Properties]** window without saving any changes.

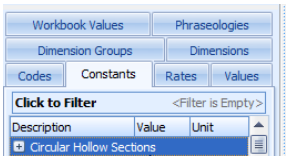
Code Libraries

Codes can be used in workbooks to flag items, thereby allowing the workbook to be re-sorted according to codes e.g. If a workbook has been structured in an elemental format and needs to be re-sorted to a trade format (or vice versa), this can be accomplished by generating a new workbook based on assigned codes. Code Libraries for any other coding categories such as building level, building block, options, accounting codes, etc; can be set up and used.

7.26. **Click** on the **[Costing]** button at the bottom left of the **[System Administration]** window, then open the **[Code Libraries]** folder above.

By clicking on the drop-down arrow on the Import button codes established in other people's CostX® systems, Buildsoft, or in Excel® (saved as .csv) may be brought into CostX®. Similarly, code libraries may be exported to Exactal Exchange File (.exf) or spreadsheet (.csv) formats. Coding is covered in the Advanced Training course.

Constants



A library of Constants can be set up or imported into CostX® for use in Workbook calculations e.g. structural and reinforcing steel weights, labour and plant hours, or conversion factors. Once entered Constants can be accessed and dragged into Workbooks from the Constants tab in the side pane. Lists of Constants may be prepared in Excel® where column A contains the Name, B the Value, C the Unit of Measure and D the Folder used to group the Constants. Use the Save As feature in Excel® to save the list as a CSV file type.

7.27. **Click** on the **[Constants]** folder button.

7.28. **Open** the **{ Steel Constants.csv }** file from the training data set and review the content.

7.29. If not already established in your system, use the **[Import Constants from CSV]** option on the Import button drop-down menu in CostX® to import this.

7.30. **Click [Close]** to exit out of **[System Administration]**.

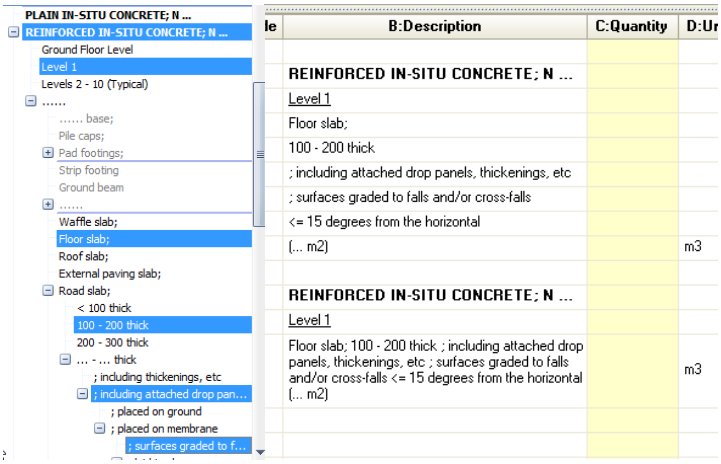
7.31. **Drill down** into the **[C:Quantity]** column of the Workbook to open a Qty sheet.

7.32. **Click** on the **[Constants]** tab in the side bar to see the Constants folders that were imported.

7.33. **Click** on a ⊞ **button** to open a folder then **drag-and-drop** a Constant into the **[F:Factor]** column of the Workbook. A live-link has been established to that Constant meaning that any quantity calculation entered on that row will be factored by the value of the Constant.

Phraseologies

A library of standard phraseologies or model description libraries may be imported into CostX® and accessed via a Phraseologies tab within Costing View to drag and drop predefined text into workbooks. Text strings may be selected individually or combined to create detailed descriptions.



Rate Libraries

We have already created a Rate Library in an earlier exercise however it is worth noting that by clicking on the drop-down arrow on the Import button rate libraries established in other user's CostX® systems, Buildsoft, CIT C21 or in Excel® (saved as .csv) may be brought into CostX® along with downloads from CostWeb. Similarly, rate libraries may be exported to Exactal Exchange Files (.exf).

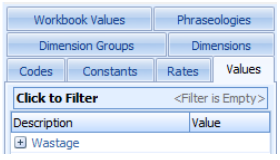
Rate Libraries prepared in Excel® must start in row 1 of the worksheet (i.e. contain no heading row) and have data entered into the respective columns outlined below. Use the Save As feature in Excel® to create a CSV (comma delimited) file type.

	A	B	C	D	E	F
16	Ply-9mm	9mm Construction Plywood - 5ply	Sheet Material	m2	14.92	Auckland
17	Ply-12mm	12mm Construction Plywood - 5ply	Sheet Material	m2	15.74	Auckland
18	Ply-17mm	17mm Construction Plywood - 7ply	Sheet Material	m2	20.5	Auckland
19	Ply-21mm	21mm Construction Plywood - 7ply	Sheet Material	m2	22.36	Auckland

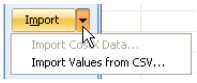
A.Unique Code B. Description C. Folder Name D. Unit of Measure E. Rate F. Location

Values

Values can represent any numeric amount that you wish to reference in workbooks e.g. wastage factors, margin, overhead allowances, etc. Once entered, Values can be accessed and dragged into Workbooks from the Values tab in the side pane.



Lists of Values may be prepared in Excel® where column A contains the Name, B the Value, and C the Folder used to group the Values. Use the Save As feature in Excel® to save the list as a CSV file type. This can then be imported into CostX® using the Import Values from CSV option on the Import button drop-down menu.



Values may set up or overridden on a per project basis by setting up a list of Values in the Project Properties window.

Module 8: 3D Measurement

CostX® has the ability to extract quantities from BIM (Building Information Model) drawings in a 3D format. There are a variety of methods that can be used to extract these quantities which range from single selection of objects through to an automatic quantity takeoff. This section of the exercise will run through the various techniques that can be used in order to extract quantities as these differ from techniques used on 2D drawings. The drawing used is a DWF (Design Web Format) file published from Revit® Architecture.

Building Set Up (PFC 5-1)

8.1. Firstly **[Add]** a **[New Building]**, give it a **name** (e.g. "**Building 3 - BIM**") and **select** the **Project** named '**Training-Your Name**' to attach it to.

8.2. Once the Building has been created **click** the **[Add]** drawing button. From the training dataset **select** the drawing **{ EcoHomes 3D.dwf }** and **click [Open]**. In the **[Drawing Properties]** window, **enter [Folder:]** name "**3D Model**" and **click [Insert]** to add the drawing.

Navigating Around the Drawing and Adjusting Views (PFC 5-2)

There are a number of ways to navigate around the drawing. Similar to a 2D drawing you can zoom in and out via the mouse wheel. You can also hold the wheel to pan around the drawing. You will also notice that there is a View Cube in the top right hand corner of the drawing view. This can assist to move the drawing around to a selected viewing perspective by clicking on any of the face, edge or corner facets. It is also possible to rotate the drawing by holding the left click on the mouse and moving the mouse.

Note that when a 3D drawing is selected, additional icons in the ribbon will be illuminated. These icons can be clicked on and off and will return a different view of the model each time another icon is selected. These icons can be selected simultaneously or separately and provide different views.

When the drawing is added CostX® also creates a number of layers. This allows the user to switch off layers in a similar way to 2D drawings.

8.3. CostX® also allows individual objects to be temporarily hidden. To do this **position the mouse over the object**, **click the right mouse** button and **select [Hide Object In]** from the menu. **Try hiding** some of the **roof** or **external wall** objects.

Notice that internal objects (e.g. doors, fittings etc.) that were previously obscured from view can now be seen and selected (by moving the mouse over them).

8.4. To re-display all objects again **right click** anywhere on the drawing and **select [Show All Objects]** from the menu.

8.5. It is also possible to walk through the building. To do this, firstly **select** an **elevation view** by using the view cube. Then, **holding the E** key on the keyboard, **move the mouse** either **forwards** or backwards to move through the building (see overleaf). You can then scroll the mouse wheel to zoom in and out and or hold down the mouse wheel to pan around. To return to the normal view, **click** the **right mouse** button and **select [Reset View]**.

8.6. CostX® additionally allows the displayed objects to be filtered by their grouping information. In this part of the exercise we will filter the door objects. Firstly **select** the **front view** by clicking the right mouse button and selecting Default View. **Move the mouse over the external garage door**, **click the right mouse** button then hover the mouse over the **[Show Only Objects In]** menu item. A sub-menu is displayed with up to four increasingly refined grouping levels. **Click** on the top **{ Doors(19) }** item to display all 19 doors (i.e. all types and sizes).

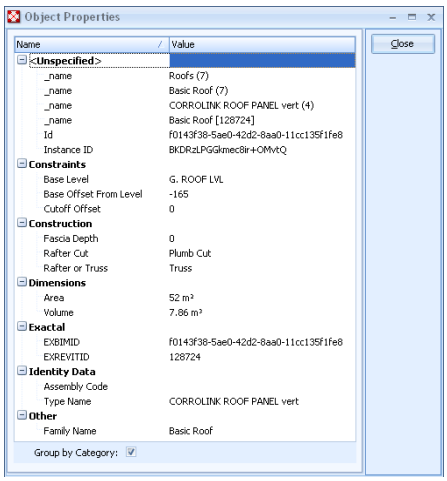
8.7. Next **right click on** one of the **flush internal doors**, hover the mouse over the **[Show Only Objects In]** menu and **select** the 2nd sub-menu item **{ M_Single-Flush (10) }**. Notice now that only the 10 flush doors are displayed.

8.8. **Right click on** one of the **displayed doors**, hover the mouse over the **[Show Only Objects In]** menu and select the **3rd filter sub-menu** item which will be the size of the selected door. Notice now that only a few doors matching the selected size are displayed.

8.9. To display all 19 doors again re-select the top option of **{ Doors(19) }** sub-menu. To re-display all objects again **right click** anywhere on the drawing and **select [Show All Objects]**.

Measurement

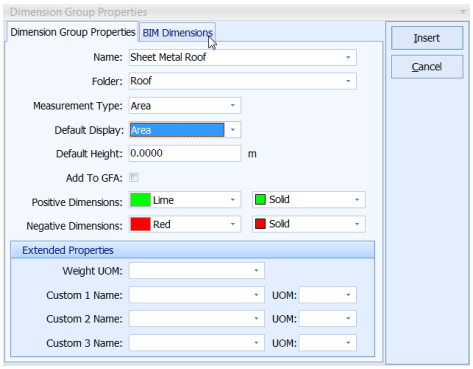
8.10. Before commencing measurement it is worth taking a look at the data contained within the model. To view this data **move the cursor over an object** on the drawing, **right click** and **select [Object Properties]**.



A window will open listing the properties specific to that object (i.e. roof). The Object Properties contain the parametric model data exported into the DWF file from the Revit® model. In this model the Revit® naming conventions form part of the object's family hierarchy, this being the category, family name and type. All of these are useful for both automatic and manual takeoffs. The other important information that is provided is the dimensions.

8.11. **[Close]** the window

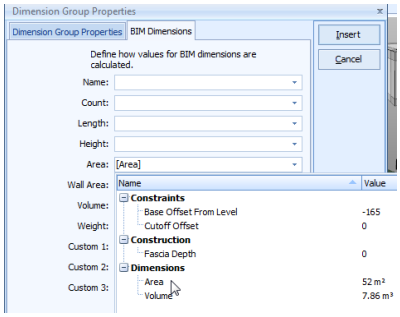
Object Mode (PFC 5-3)



Normally the workflow sequence when taking dimensions from 3D drawings would be to generate the quantities automatically from the BIM properties (this is covered in further detail later in this section). Supplementary dimension groups and additional measurement can subsequently be added as required. However for the purpose of progressively introducing the principles of the topic in this training exercise we will reverse the normal workflow and start with the measurement of individual objects.

Object Mode differs from normal 2D measurement. The first aspect that is different is in creation of Dimension Groups.

8.12. To create a Dimension Group in Object Mode, **right click on a roof object**, in this case the roof, and **select [Create Dimension Group].**



8.13. **Fill out** the **[Dimension Group Properties]** as per the first example screen shot then **click** on the **[BIM Dimensions]** tab.

These fields allow the user to select the source of the object property information from the model to create dimension group parameters.

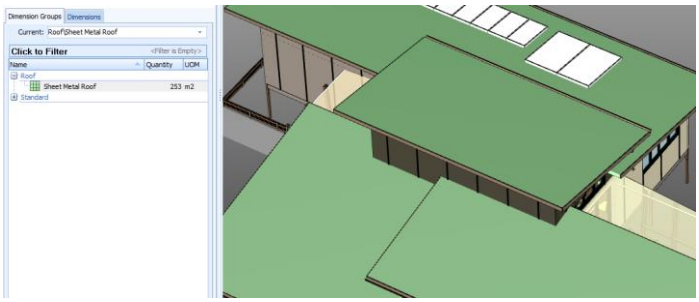
8.14. For this example first **select the drop down menu** next to the **[Area:]** field. The drop down menu displays the **[Object Properties]** list. From the list **select** the **Area** property.

8.15. You will also note that there is another object property listed referring to the volume. **Select Volume** using the drop down menu next to the **[Volume:]** field. This will allow this secondary quantity to be available from the dimension group.

8.16. **Click [Insert]**. The dimension group will be added to the task pane ready to receive dimensions.

8.17. To measure the roof **move the cursor over the roof object**. Once the object is highlighted, **click** the **left mouse** button to select the object. Once selected, the quantity will be added to the Dimension Group.

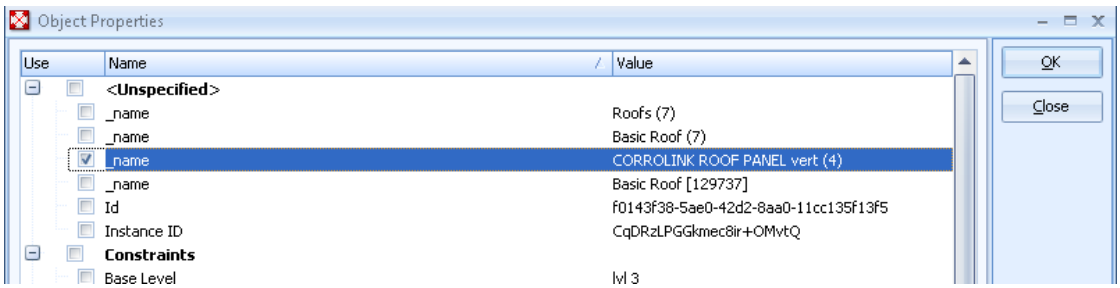
8.18. **Continue selecting** the other roof **objects**. Once complete the four roof objects should be selected and the Dimension Group should indicate a quantity of 253m2 as per the screenshot below. **Hover the mouse over the Dimension Group** and the hint box will also show the number of roof areas measured (count) and the volume.



An alternative and faster way to measure in Object Mode is to select objects which have matching properties. This will select and measure all objects from the model which have an exact match to the selected properties (e.g. name, etc).

8.19. Using the roof again, firstly **clear** the previously **measured dimensions** by right mouse button and select **[Clear all dimensions]**.

8.20. To select and measure multiple objects at once, **right click on an object**, in this case the roof, and **select [Import Object In]**, from the proceeding submenu **select [Custom...]** The **[Object Properties]** window will open in which there is the option to check the boxes to determine which properties will be selected to filter the objects. For this exercise **check** the box next to **[CORROLINK ROOF PANEL]** and **click [OK]**.



CostX® will now search for anything in the model that has a naming convention of CORROLINK ROOF PANEL and return the object quantity. Notice the quantity returned is the same as the previously used method for measuring the roof.

Importing Dimensions from BIM properties (PFC 5-4)

> *CostX® also gives the user the option to import dimensions in an automated process directly from the 3D model. This is done by extracting the parametric model data from the object properties within the DWF, and creating a list of Dimension Groups populated with quantities. This can be done for selected objects or for all objects within the model.*

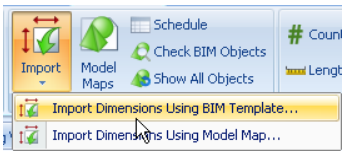
8.21. Firstly **select** the **{ Sheet Metal Roof }** dimension group, **click the right mouse** button and **select [Delete Dimension Group]**.

8.22. To import dimensions for selected objects, in this case doors, first **right click** and **select [Show All Objects]**.

8.23. **Move the mouse on** to a section of **roof**, **right click** and **select [Hide Object In]**, and in the following sub menu select **{ Roofs (7) }** to reveal the building interior.

8.24. **Hover over an internal door** and **right click**. **Select [Show Only Objects In]** and **click** on **{ Doors (19) }** so that only the 19 doors are displayed.

8.25. On the **[Dimensions]** ribbon, **click** the **[Import]** button and **select [Import Dimensions Using BIM Templates].**



8.26. A **warning message** will state that Data will be imported for visible objects only, **select [Yes]**.

> *The Select BIM Import Template window will appear containing a list of XSLT files written specifically to extract and sort data from the model. The data can be extracted from various object parameters, but the default is to categorise it in accordance with the Revit® object hierarchy of category, family name and type.*

8.27. A **Select [BIM Import Template]** window will appear. **Select** the **BIM Import Revit® General** file and **click [Open]**.

> *A progress bar will appear whilst the system extracts data from the model and creates Dimension Groups using the Revit® category to name the Dimension Group Folder, and the Revit® family name + family type to name the Dimension Group.*

8.28. A Dimension Group Folder named Doors will be created populated with the door quantities. **Open** the **[Dimension]** tab for an individual Dimension Group and use the right click menu to view or isolate individual dimensions.

8.29. Now **right click on the drawing** and **select [Show All Objects]**. Use the **[Show Only Objects In]** as before to **display** only the **windows** and then **import** the **window dimensions**.

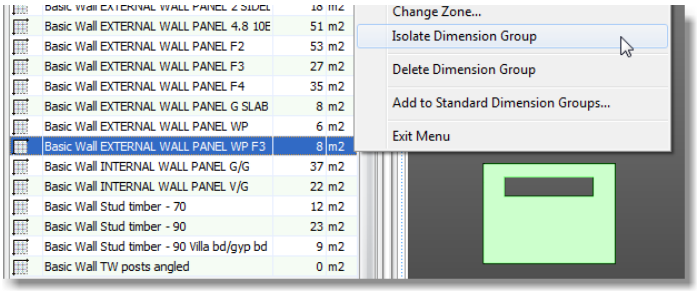
> *This process demonstrates that the BIM dimensions will be imported for whatever objects are displayed on the screen.*

8.30. To import the dimensions for all objects that have been modelled in the drawing **click the right mouse** button and **select [Show All Objects]**, then **Import [Dimensions Using BIM Template]** as before.

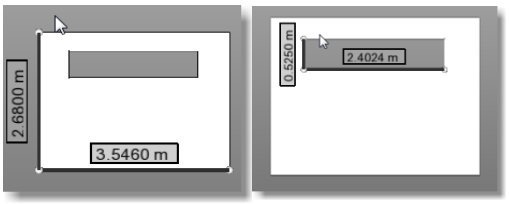
Of course, the dimensions generated are dependent upon the information that has been created in the model and may need to be augmented for estimating or scheduling purposes. This is done by adding 2D views from the DWF and measuring additional quantities, or adding additional dimension groups to complete the take-off.

Checking BIM Import

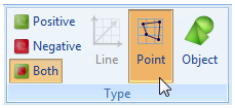
8.31. We will now use a few 3D measure functions to verify the integrity of the imported dimensions, firstly open the Dimension Group Folder called Walls and **highlight the Dimension group { Basic Wall EXTERNAL WALL PANEL WP F3 }** with 8m2. Now **right click** on this dimension group and **select [Isolate Dimension Group]**.



8.32. Now you can **use the Measure Distance** tool to click from point to point of this wall panel, hence **measure** the **length and height** of the wall panel and the opening. Remember to hold the Ctrl Key to select multiple segments. Multiplying these figures and **deducting the opening** (using a calculator) will give us 8.24 m2 compared to our 8m2 using the BIM import.

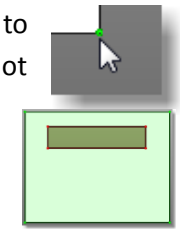


8.33. We will now carry out an alternate checking method, **select** the **[Add]** button in the **[Dimensions]** ribbon. **Create a Dimension Group** called **{ Wall Area Manual Measure }** in the folder **{ Walls }** with a **[Measurement Type:]** and **[Default Display:]**of **Area**, and **select** the **[Insert]** button.



8.34. To carry out a manual measure in 3D - **switch** to **[Point]** mode by selecting the **[Point]** button in the **[Dimensions]** ribbon under **[Type]** section.

8.35. With Object Mode switched off you will be able to **select point to point** manually, to measure an area select a point hover the mouse over the desired vertices, a green dot will appear, press the left mouse click to select.



8.36. Now select the remaining 3 corners in a similar manner and **press the Enter** key to finalise the area, similarly you can **use the Negative function** to carry out a deduction **for the wall opening**.

This measurement will register an area of around 8.24m2, which is consistent with the calculator measurement earlier and the BIM import measure. The reason for the 0.24m2 difference can be explained from the rounding settings used by the designer within the design program. The setting allows designers to set the number of decimal places for rounding. This particular model has all the Areas rounded to no decimal places, hence the 8.24m2 have been rounded to 8m2.

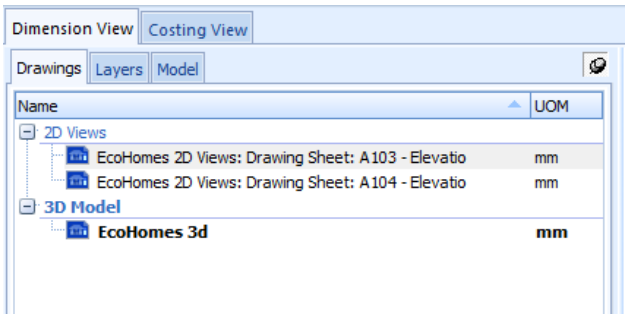
Additional Quantities

8.37. The BIM import created a Dimension Group folder named Mass. **Open** the **{ Mass }** folder and note that it contains numerous Dimension Groups with a quantity of 1. **Select one of the Dimension Groups** then **click the right mouse** button and **choose [Isolate Dimension Group]**. A single batten on the façade cladding will be shown on screen.

8.38. **Move the mouse over the batten**, **click the right mouse** button and **select [Show Only Objects In]**. A menu will open outlining the Category, Family, Type and the individual Object. **Select** to **filter by the Category**, Mass (117) to show all of the Mass objects

8.39. The battens need to be measured by length. **Click the right mouse** button **over a batten** and **select [Object Properties]**. You will see that the designer has not established a linear parameter for these objects in the model therefore the length will need to be measured in normal mode.

8.40. **Add** the drawing **{ EcoHomes 2D Views.dwf }** from the dataset. This is a multi-sheet dwf containing several 2D views of the model. It is possible to select all views but to avoid cluttering the drawings list **select** and **insert { Elevations 1 } and { Elevations 2 }** under Drawing Folder called "**2D Views**" using the Ctrl key to do multiple select.



8.41. **Close** the **{ Mass }** Dimension Group folder and then **click** the **right mouse** button and **select [Delete Folder]**.

8.42. Now **click** on the **[Add]** button in the **[Dimensions]** ribbon menu and **add a Dimension Group** called **{ Battens }** in the **{ Walls }** folder, with a **[Measurement Type:]** and **[Default Display:]** of **length**.

8.43. **Measure** the **battens** from each of the four elevations by clicking on them in the normal way.

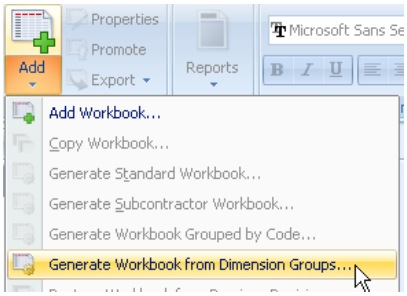
> *Using this method it is also possible to add additional dimensions into the existing BIM generated Dimension Groups, if required.*
>
> *As there are no ceiling objects in the model, the BIM import didn't generate any ceilings dimensions. Therefore add the EcoHomes 2D Views.dwf drawing again, this time selecting the ceilings plan.*

8.44. **Add** a new **Dimension Group** called **{ Ceilings }** and **measure** the **ceilings** from the plan.

Workbooks

8.45. It is now possible to create a Workbook based on the Dimension Groups. Firstly **switch over** to the **[Costing View]**.

8.46. From the Add Workbook drop down menu **select [Generate Workbook from Dimension Groups]**.



8.47. In the **Workbook Properties** window type in "**Estimate**" for name of the Workbook and **click [OK]**.

CostX® will generate a two level Workbook based on the Dimension Groups and folders. On the first level (summary level) it will take across the Dimension Group Folder and on the second level (detail level) it will list the Dimension Groups and bring across the live-linked quantities. The only thing left to do is edit the descriptions, relocate any items as necessary and fill out the rates.

It is also possible to create Workbook templates and Rate Libraries pre-set to the family categorizations used by the Architect to bring a high level of automation to the process.

Disclaimer

This dataset is an example only, to be used solely for the purpose of the training exercise. It is not to be used as a template for business operations. Exactal and its employees accept no liability for use of this dataset for business purposes.