

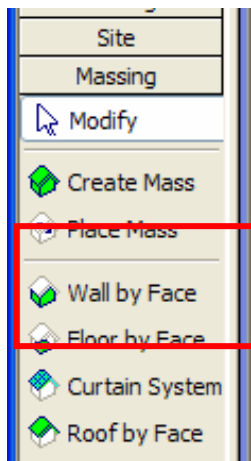
## Mass Modeling Tools in Autodesk Revit Building 8.1

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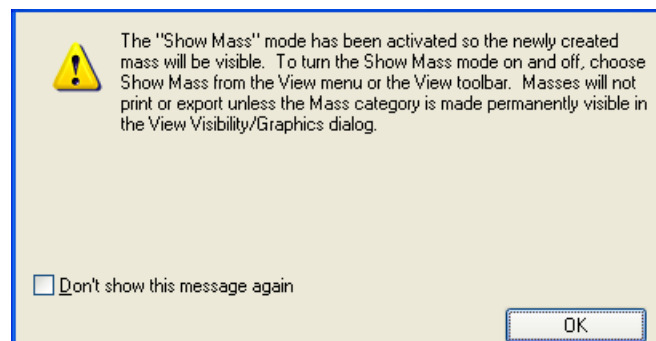
Some important features in Autodesk Revit Building 8.1 are the massing tools. These allow you to start a design with a conceptual mass modeling approach that can then be further developed by converting the mass faces into walls, curtain systems, floors and roofs. The volumes and floor areas of the masses are also able to be scheduled early in the design phase. Additionally, these are indispensable techniques that are used to create the 3D representations in Revit Families.

This article will cover some of the basics of creating and adding masses to a project and mapping them to real world building elements. I use the term *mapping* because if you use the mass faces as the basis for the creation of walls, curtain systems floors and roofs you can modify the mass and then remake the architectural elements to map to the new form.

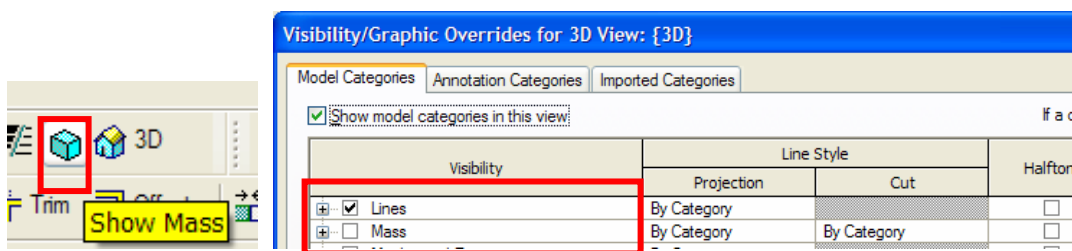
The massing tools are available on the Massing Design Bar. You can add pre existing mass families (Place Mass) or create in place masses (Create Mass).



Using either tool the first thing you'll see is a dialog box indicating that Revit has activated the Show Mass mode.

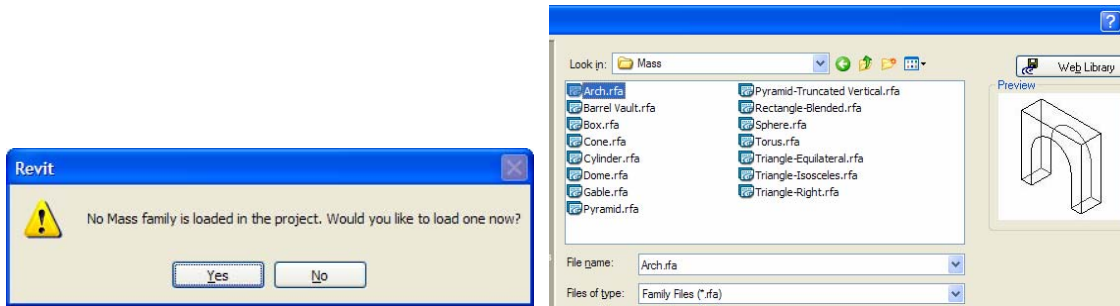


Mass visibility is controlled in the following ways:

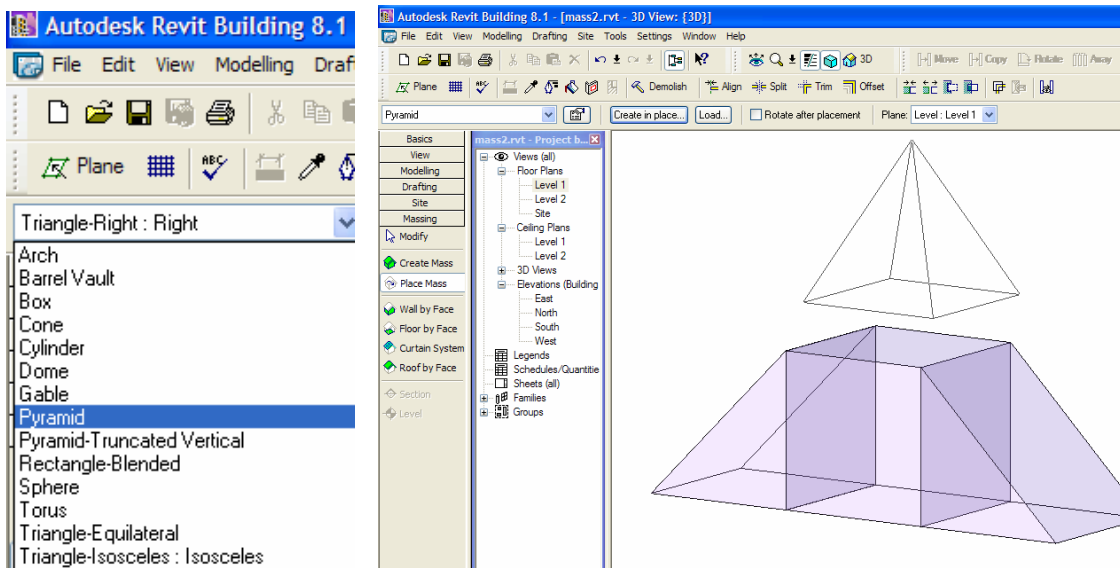


The Show Mass button on the View toolbar toggles mass visibility on and off in all views even if the mass category is turned off in the Visibility Graphics dialog in the current view. The Visibility Graphic settings determine if masses print and whether masses are visible when the Show Mass button is not selected. If Masses are turned on in Visibility Graphics, masses show in that current view whether or not the Show Mass toggle is on. The show mass toggle is a convenient tool to hide or show masses when mapping building elements to the mass faces.

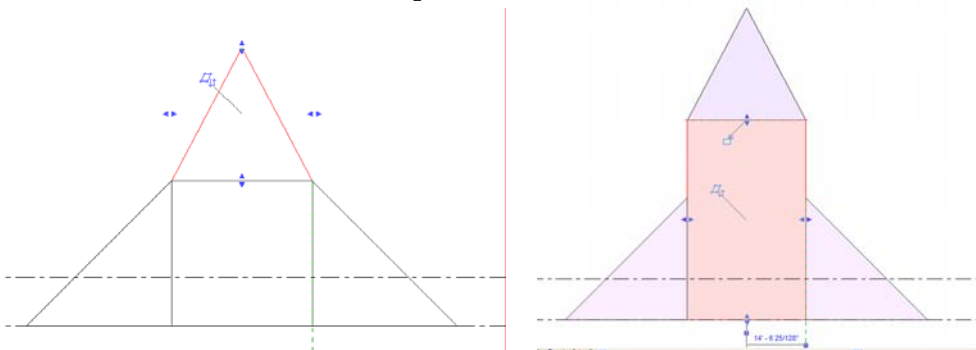
The Place Mass tool adds preexisting mass families into the view window. If there are no mass families already present in the project Revit will prompt you to load some and you can browse to the libraries.



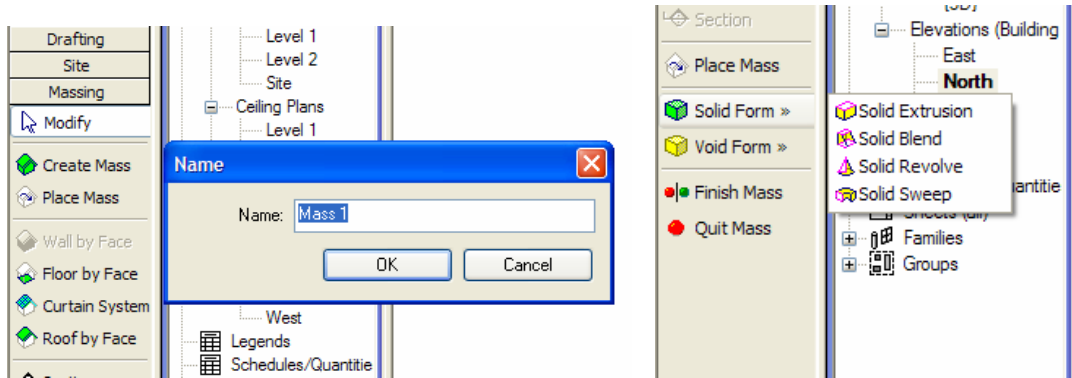
This method will allow you to only select and load one mass family at a time since it next allows you to place it in your drawing area. To load more than one mass family at a time use the *Load from Library* option from the file pull down menu. Any preloaded families in the project will be available in the type selector pull down.



These primitive mass shapes can be edited with shape handle grips that stretch each face but maintain the basic shape.

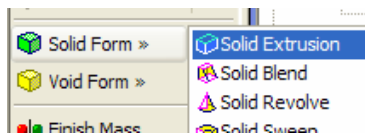


Mass Forms can also be created as solid extrusions, solid blends, solid revolves and solid sweeps. These are accessed by starting the *Create Mass* tool, naming the Mass and selecting the desired method from the Design Bar.



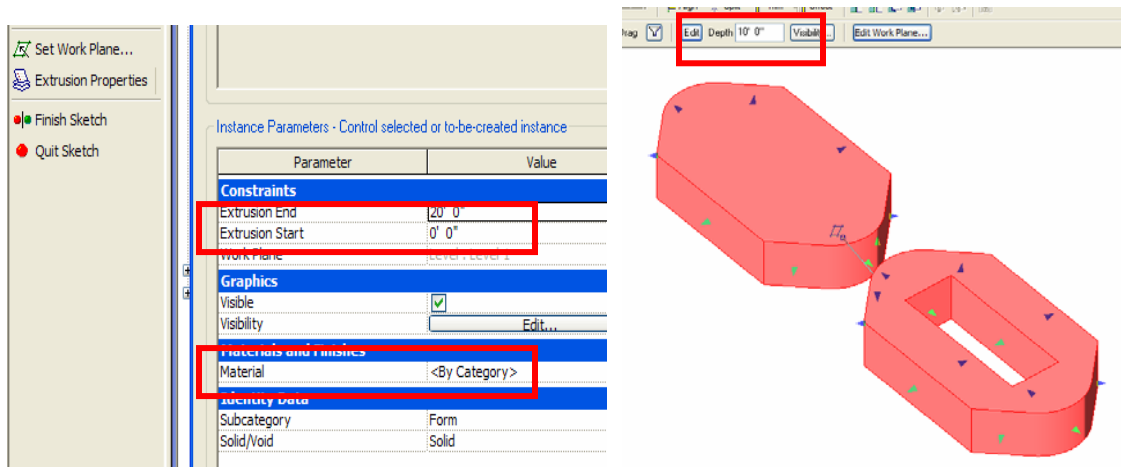
This command puts you in Mass mode and you can place multiple forms and they will all be considered part of the same mass when you select Finish Mass on the Design Bar. Launching one of the Solid or Void creation methods puts you in sketch mode. You can always get back into Mass mode and sketch mode to edit the individual forms.

Each of these options allows you to use the typical Revit sketch tools to draw the extruded, blended and revolved shapes and the shape and path for sweeps.

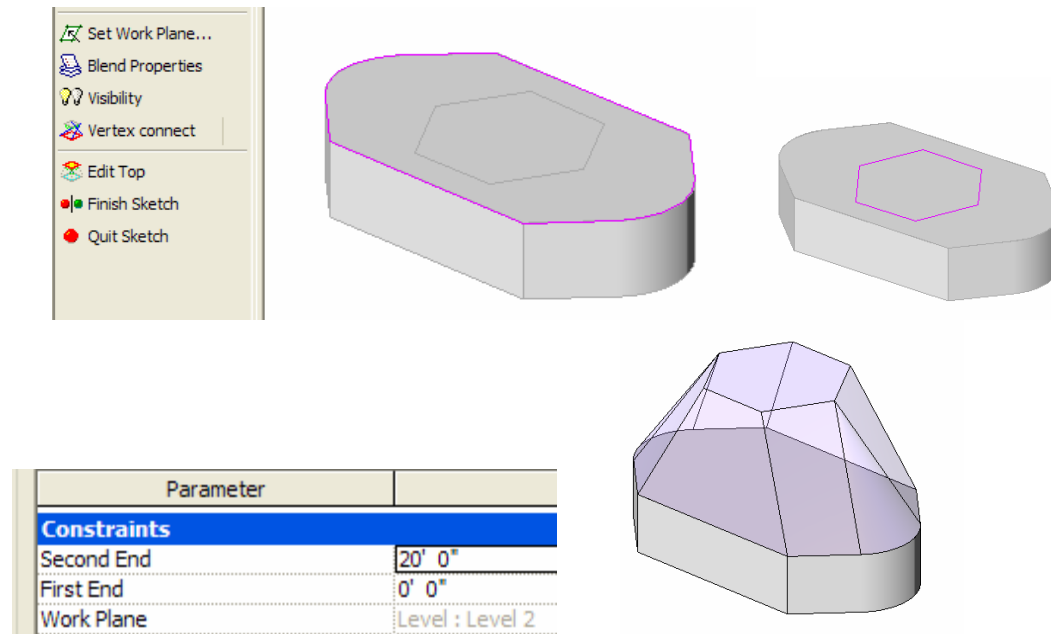


In the **Solid Extrusion** you define the closed shape and set the extrusion height. Inside islands become voids through the whole extrusion height. The extrusion start and end can be set in the extrusion properties in sketch mode or after finishing sketch on the Options Bar (Depth).

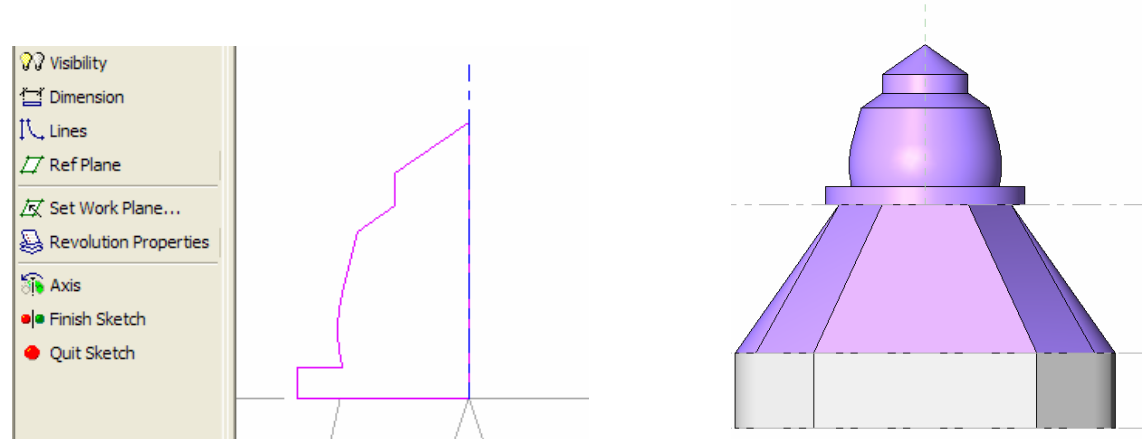
Materials of the masses are also set in the extrusion properties in Sketch mode.



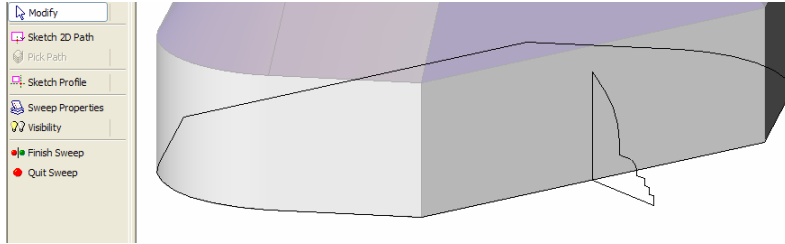
**Solid Blends** can morph or blend from one profile (the base) to another profile (the top). You sketch the base first, then select *Edit Top* from the Design Bar and sketch the top shape. The height and base elevation is set initially in the blend properties (Blend start and end). The level that is current defines the start elevation or work plane for the base.



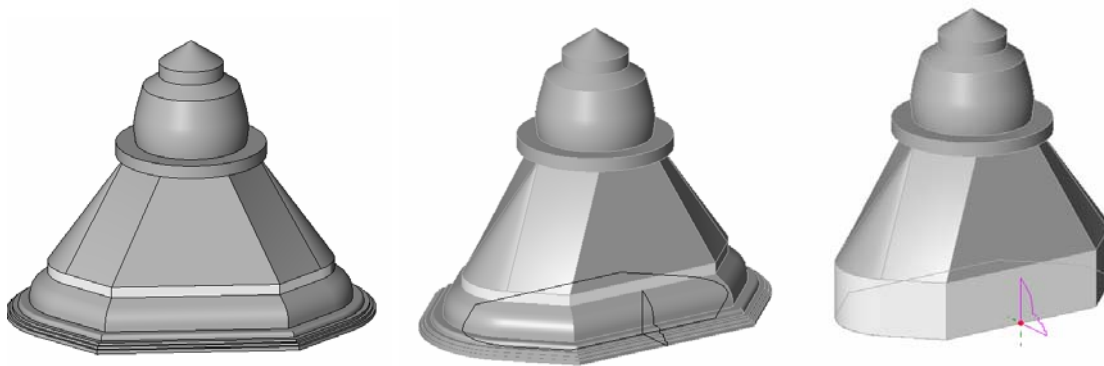
In a **Solid Revolve** you sketch the profile and the axis to revolve the profile around. Once the sketch is complete select *Finish Sketch* from the Design Bar.



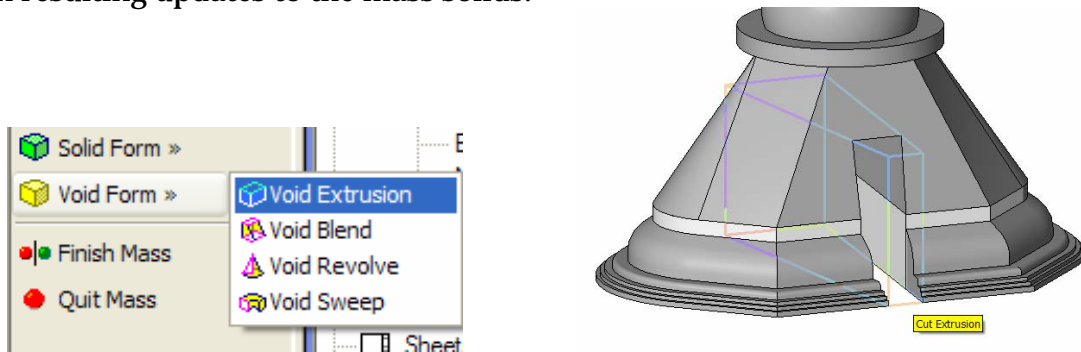
The **Solid Sweep** allows you to sketch a profile and a 2D path for that profile to follow.



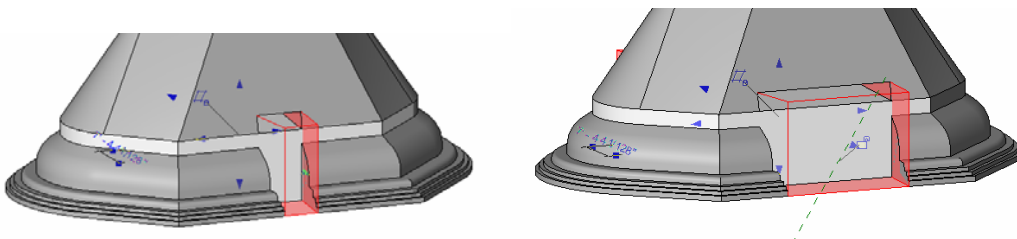
All of these shapes can be created as one Mass and the edit mode allows you to edit each extrusion, blend, revolve and sweep separately. You can also get into Sketch mode on each one to change the profiles, axis or swept path.



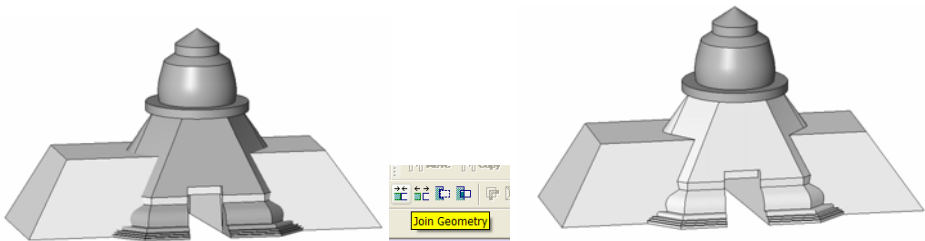
In order to remove material from masses you can create Void Extrusions, Blends, Revolves and Sweeps as part of the same Mass and they become similar to Boolean subtractions. Each of these voids can also be edited, resized and moved after the fact with resulting updates to the mass solids.



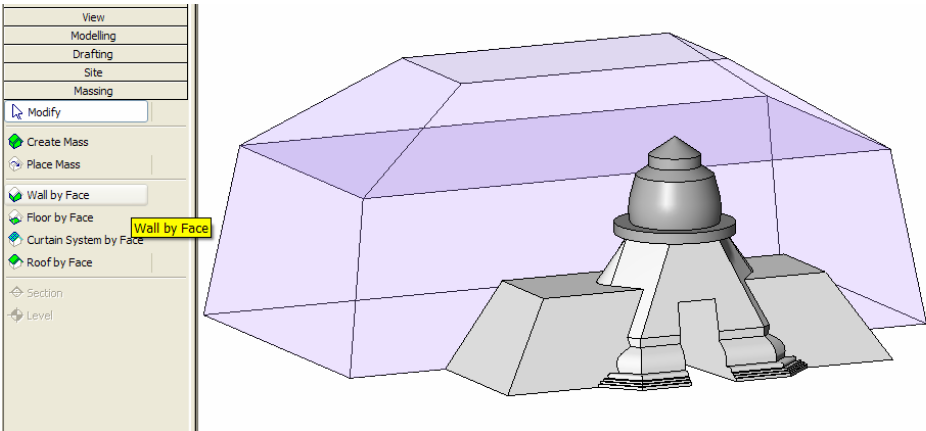
The voids also have shape handles than can stretch the void or subtracting shape.



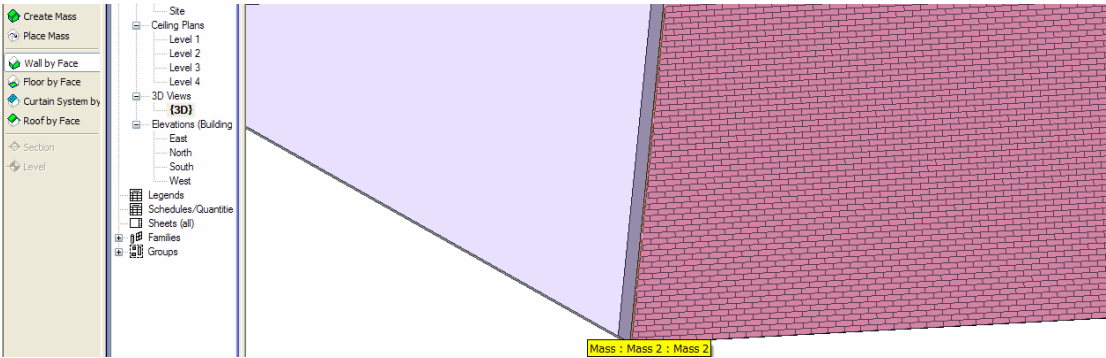
When the Mass is completed and you've hit Finish Mass the object becomes a single entity but overlapping forms do not automatically union. In the Mass editing mode you can use the Join Geometry tool on the Options Bar to union overlapping mass forms.



As the mass study begins to get developed you can create floor areas and start mapping architectural elements (walls, curtain systems, floors and roofs to the model). The best thing about this is that you can still modify the masses and remap these objects to the mass faces.

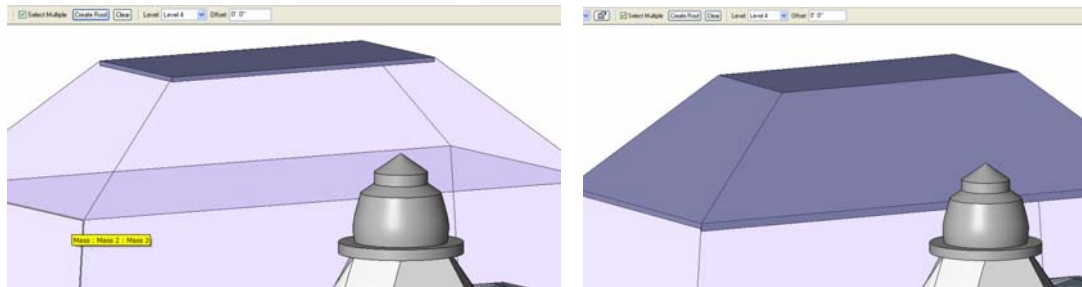


These tools are on the massing Design Bar and they each vary slightly. In the Wall by Face tool you set the desired wall type in the type selector and hover each mass face until the desired one highlights and then select it. It immediately maps that wall style to the mass surface. You can change the wall type between selections.

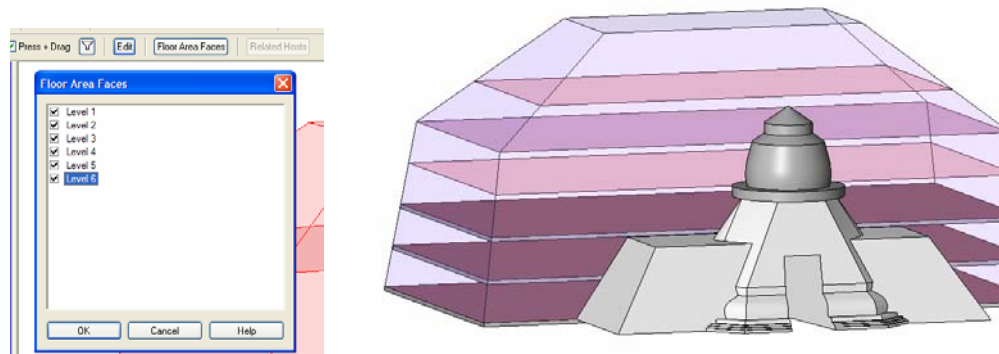


The Roof by Face allows you to select horizontal and sloped surfaces to map roof types to the mass face. If the Multiple option is off on the Options Bar the roofs are created

instantly but each face is a separate roof (suitable for flat or shed roofs). If it is checked you select multiple faces and then hit Create Roof on the Options Bar to create a single roof with multiple faces.



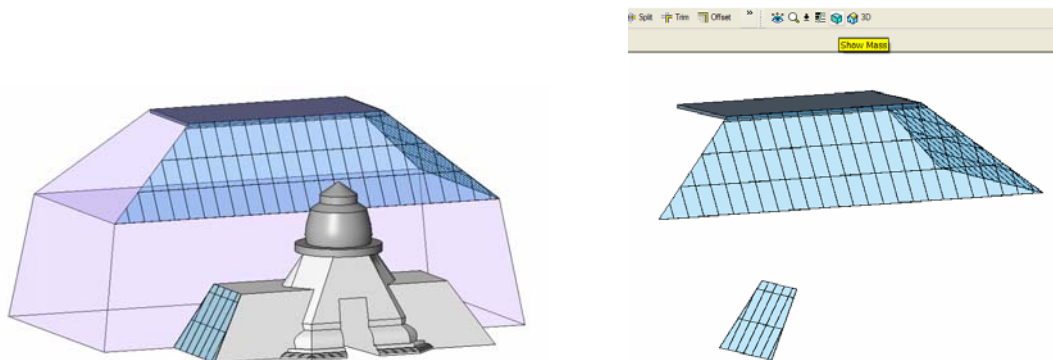
Before using the Floor by Face tool you usually create Floor Area Faces (based on your Levels) that allow you to map floors types to these faces.



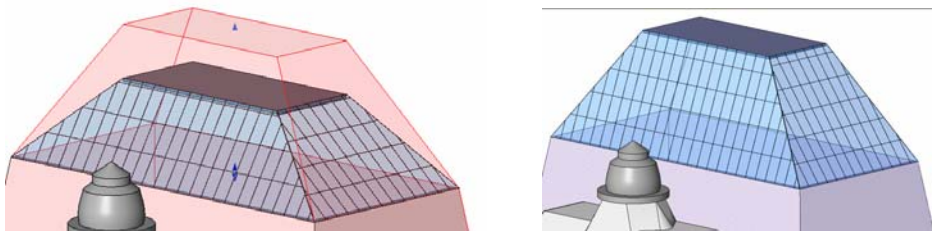
These floor areas can also show up in Mass schedules that can extract gross floor areas, surface areas and volumes.

Mass Schedule			
Type Mark	Gross Floor	Gross Surface Area	Gross Volume
M1	52251 SF	38856 SF	496696.85 CF
M2	5859 SF	12771 SF	53885.31 CF

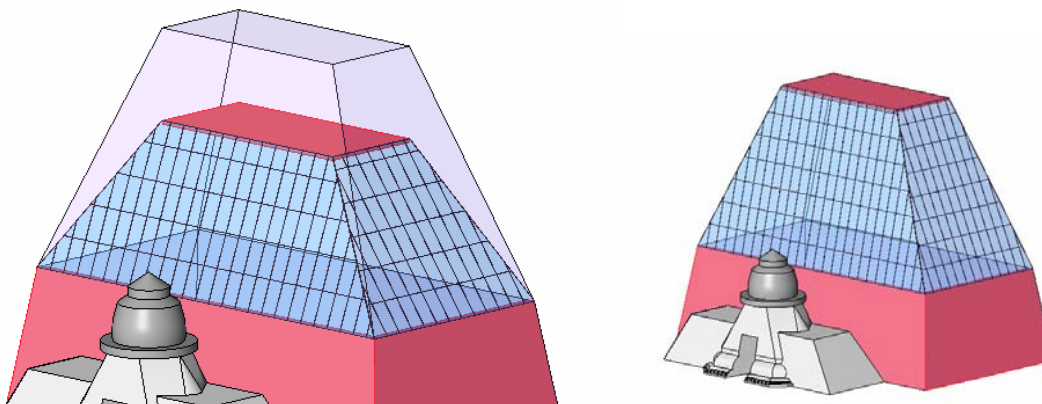
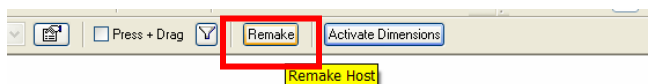
The Curtain System by Face allows you to map Curtain System types to the Mass Faces. The Show Mass tool on the View toolbar can let you toggle off the mass to just see the mapped architectural elements in the model.



All those mapped elements can be remapped if the underlying Masses change.



This is accomplished by selecting the architectural objects and choosing Remake on the Options Bar. You can do all of the architectural elements at once even different system types.



In future articles we'll see how these massing tools are used in creating the 3D representations for door and window families.