Autodesk University 2012

What's New in Autodesk® Revit® Structure 2013?

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SE1485 This class will cover the new features for Autodesk Revit Structure 2013 software. We will examine new features for creating and manipulating parts, including division profiles and merging and excluding parts. For assemblies, we will look at new features for types, origin, and views. You will learn about new reinforcing features for hosted area and path, rebar snapping, and placing structural wire fabric. Finally, you will learn about new tools for analytical modeling.

Learning Objectives

At the end of this class, you will be able to:

- Divide parts with profiles and merge and exclude parts.
- Place assembly origin accurately to easily swap types and create views on assembly orientation.
- Host area and path reinforcing and place structural wire fabric
- Modify the analytical model with new analytical tools.

About the Speaker

Rebecca (Becca) is a Structural Technician at KJWW Engineering Consultants in Rock Island, Illinois. She has worked exclusively with Autodesk® Revit® Structure since January 2007. Her duties include: Providing Revit Structure Training, Research, Content Development, Maintenance, and Standards. Along with BIM Modeling and producing Construction Documents. She provides input to KJWW's BIM Core group for companywide standards and coordination between Revit MEP and Revit Structure throughout KJWW's offices.

She also works closely with 4D Technologies, an Autodesk Authorized Publisher and developer of CADLearning, to create self-paced learning products for the latest CAD and BIM software, specifically the Revit Structure courses.

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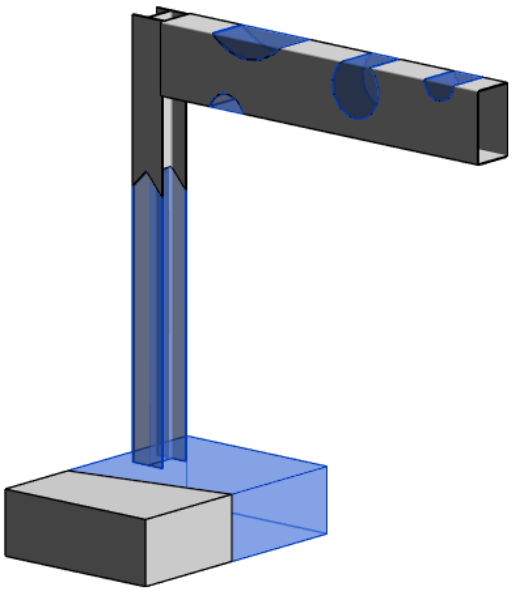
Parts

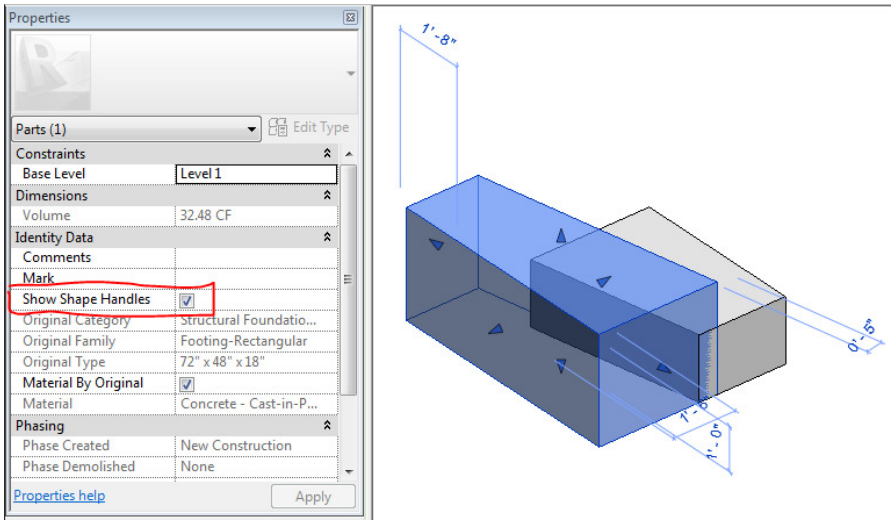
In addition to walls and floors, Parts can now be made from loadable families like columns, beams, and isolated foundations.



Revit will remember your edits to the parts when switching between types of the same family (i.e. HSS12 to HSS10) however will only remember that parts were created (resetting their shape) when switching types to a different family (ie HSS to W-Flange).

Shape Handles

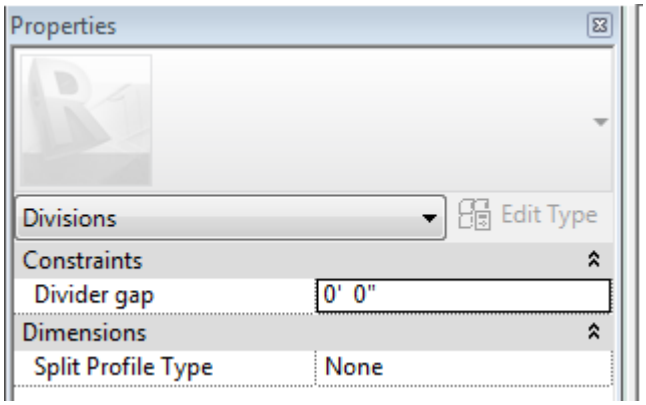
Once you create parts and select Show Shape handles. All faces are now adjustable with shape handles instead of just the sides like in 2012.



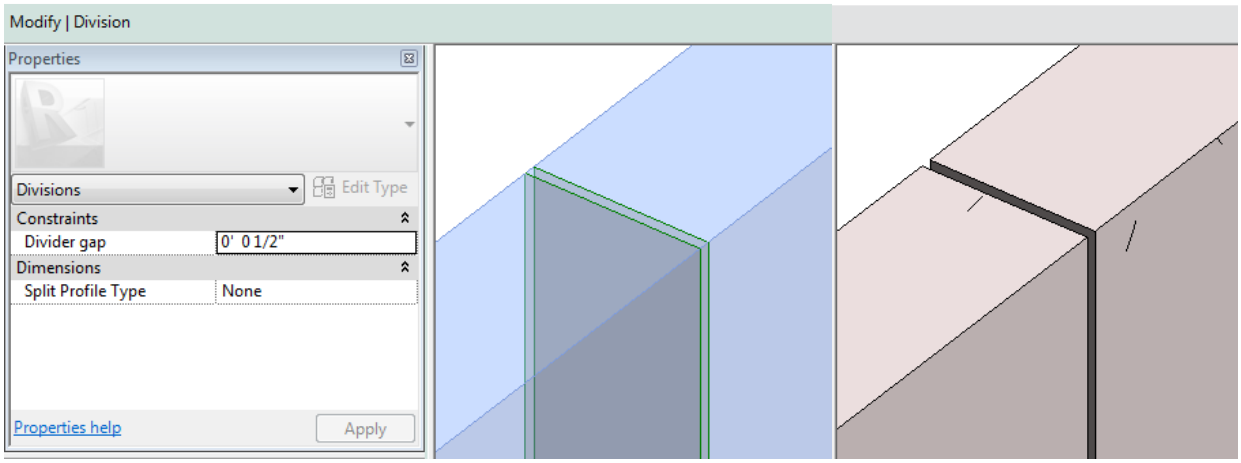
Once the part has been modified by moving the shape handles, the Reset Shape tool becomes active to return the part to its original extents.

Divide With Gap and Division Profiles

When dividing parts you have the options to specify a gap distance and/or Division Profile.



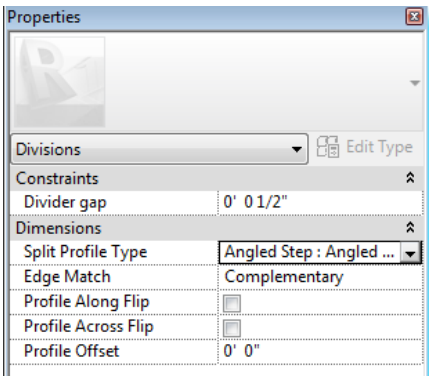
Simply changing the divider gap value will create a void that dimension centered about your Division line.

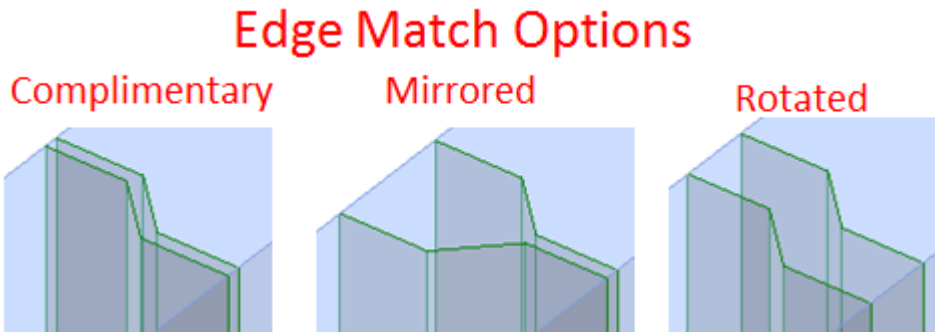


You can also select a Split Profile Type for elements/categories which always have parallel faces (walls, floors, roofs, slabs)… Three different profiles types come with the Revit 2013 content pack (Library>Profiles>Division Profiles):

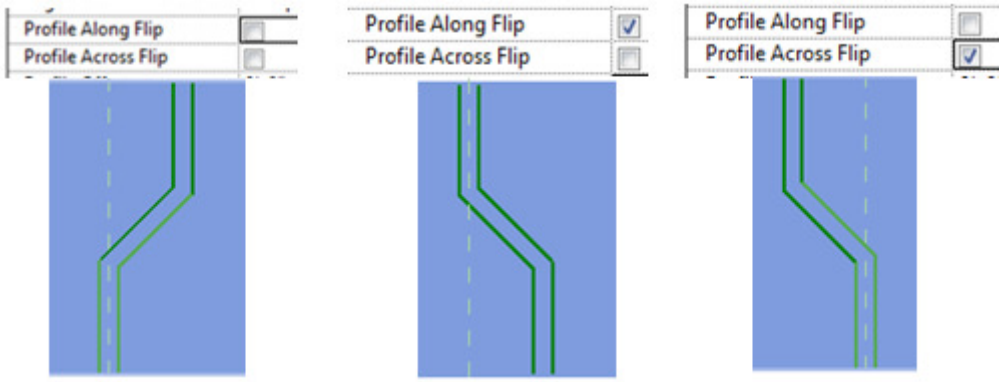
Angled Step : Angled Step
Notch : Notch
Tapered Notch : Notch Depth

Once you select a profile, additional options are available.. Whichever option you choose, the Divider Gap distance will be maintained at the profile's centermost edges.

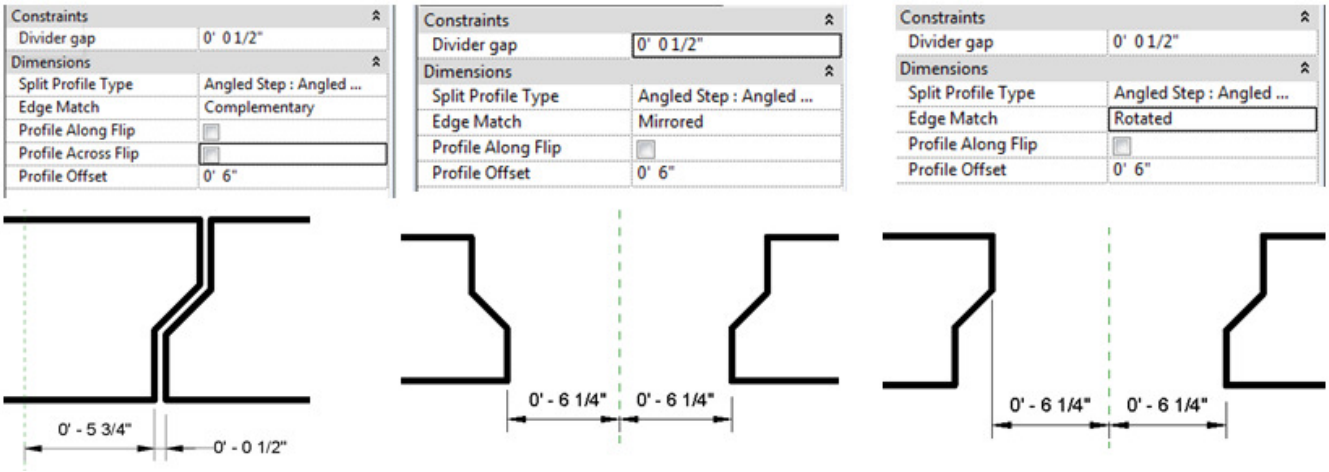




You can Flip the profile Along (horizontally) or Flip the Profile Across (vertically).



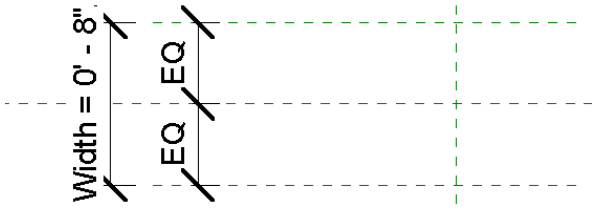
The profile offset is the distance the profiles are offset from the dividing line. Remember to also take into account the distance you set for the divider gap which is offset about the center of the division line. For example, if I set the divider gap to ½" and the Profile offset to 6" this is how my divisions would look:



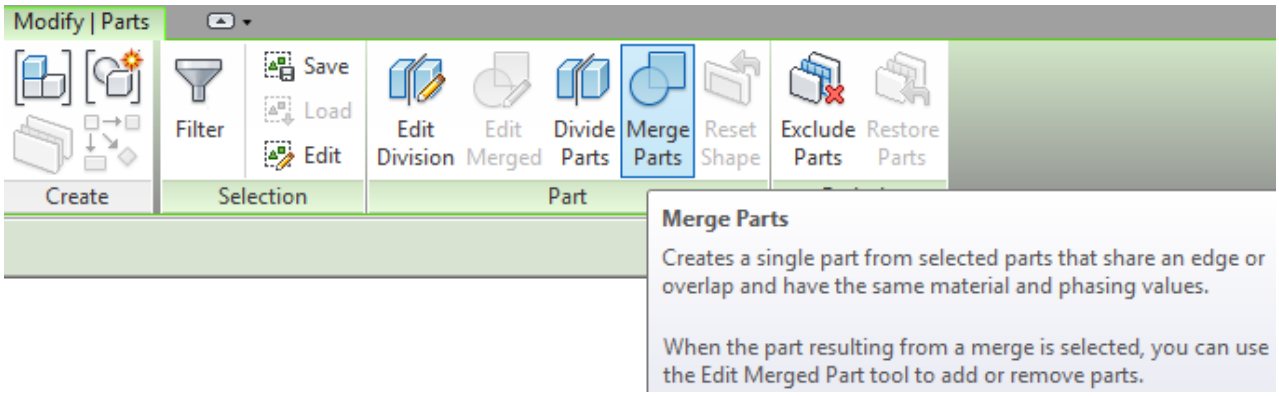
As you can see for the Mirrored and Rotated profiles it probably makes more sense to use either the Divider Gap distance OR the Profile Offset distance, but not both.

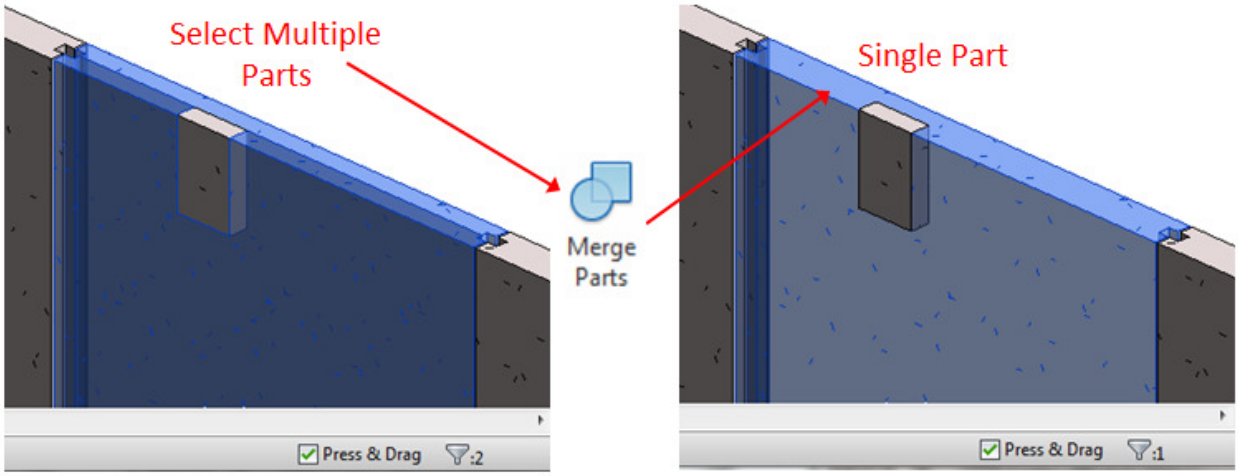
Creating Custom Division Profiles

You can create division profiles like you do any other family -  > New > Family and select to open the Division Profile family template. The width parameter in the family will adjust to the width of your part.

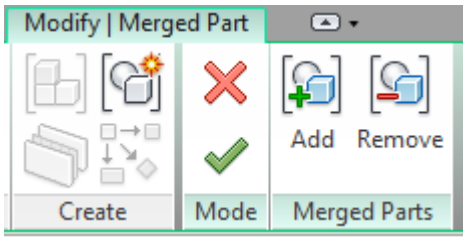


Merge Parts

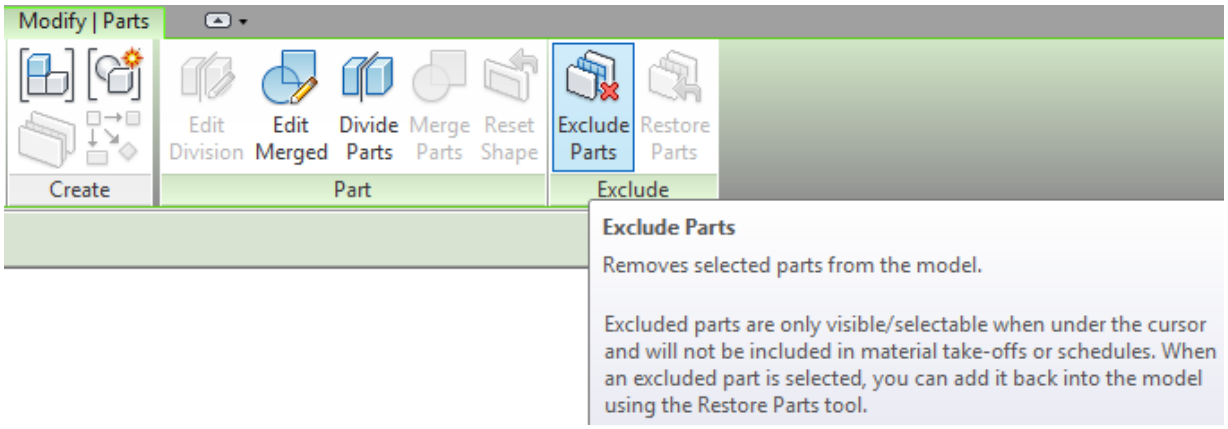


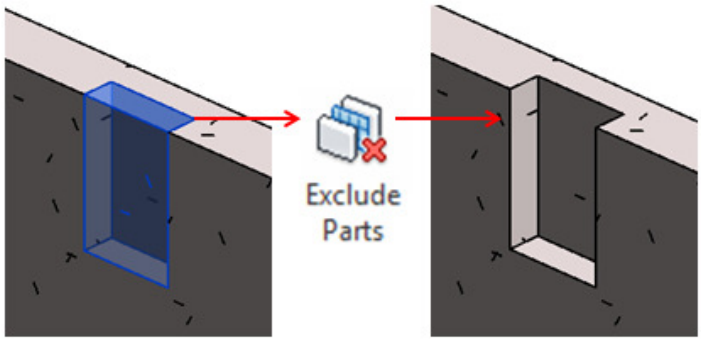


To add or remove parts from your merged part, select Edit Merged. Then in the contextual ribbon the Add and Remove Options are available.

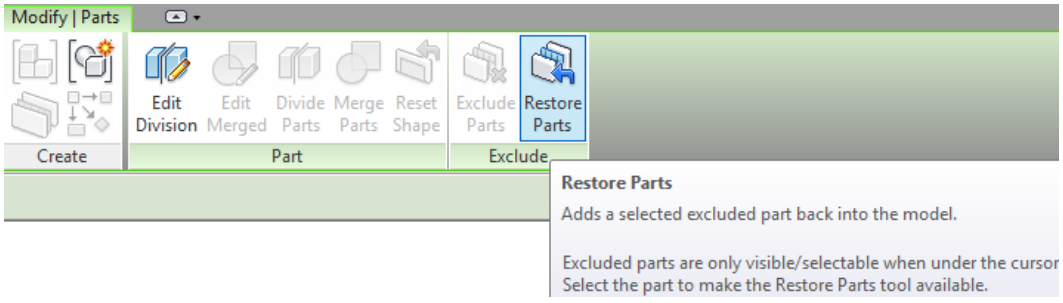


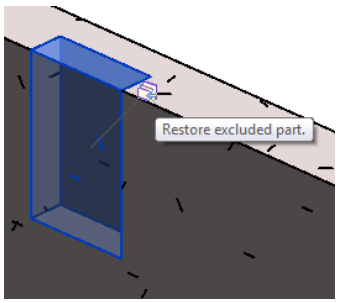
Exclude Parts



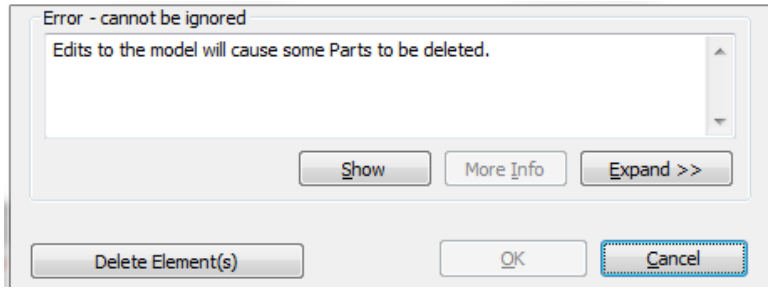


To restore excluded part, hover over or tab to select the excluded part. An icon will appear to restore part, or use the Restore Part tool in the contextual ribbon.



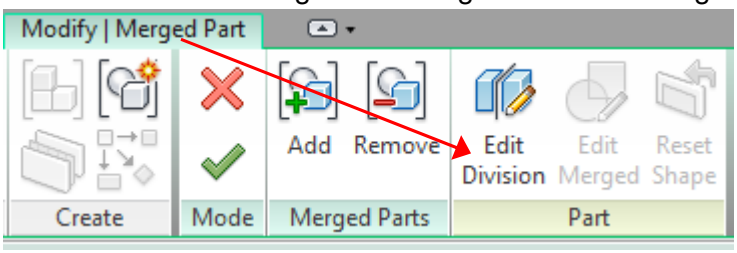


If you *delete* (instead of exclude) a part that was created by dividing a larger part, the larger part will be restored to its previous state



Traveling Back in Time with your Parts

Revit now keeps track of the order in which you divided, merged or excluded parts. You can then edit the parts by systematically returning to edits you made earlier that comprise your final part. Do this by selecting Edit Division or Edit Merged as it's available in the contextual ribbon. Then selecting the part it came from and again selecting edit division/merge.



Creating Parts from Linked Models

You can select elements from a linked model to create parts in your host model without having to copy the original element first. Since Tab-Selecting elements in a linked model can be cumbersome, Start the Create Parts tool from the modify ribbon first, and then select the elements from the Linked Model that you want to create parts of. Right-Click enter and you can now divide, merge, and exclude those parts.

As the original element changes in the linked model the parts in the host model will update upon reloading. Revit will try to maintain any edits to the parts you made.

However…If the original element in the linked model is deleted, once reloaded in the host file, the part will become orphaned. You will get a warning listing the orphaned parts, but one could simply click "ok" and not delete the orphaned parts. Leaving you with incorrect representation in the host model. Collaborate ribbon> Coordinate panel> Reconcile Hosting will show you orphaned parts. What could throw your model off even further would be to have these orphaned parts in your model, with all the view set to "show Original" You could end up possibly having orphaned parts still in your model behind the scenes.

Parts should not be an alternative to modeling the actual elements. Parts do not share the same join habits or relationship to other element categories. A beam will not break back from a part that has been created from a wall, and Parts created from walls will not join nicely at the corners unless you merge parts.. and so on.. Parts are intended to show construction intent, not used to create the overall building model.

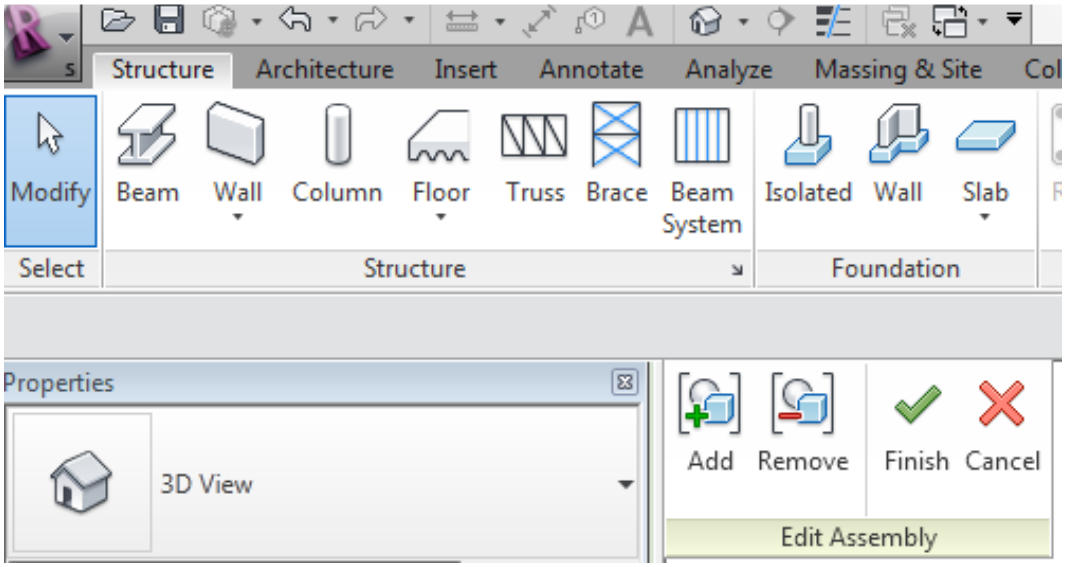
What happens to the analytical model?

The analytical model is not affected by creating parts on structural elements. It remains one element related to the original element you created parts from.

Assemblies

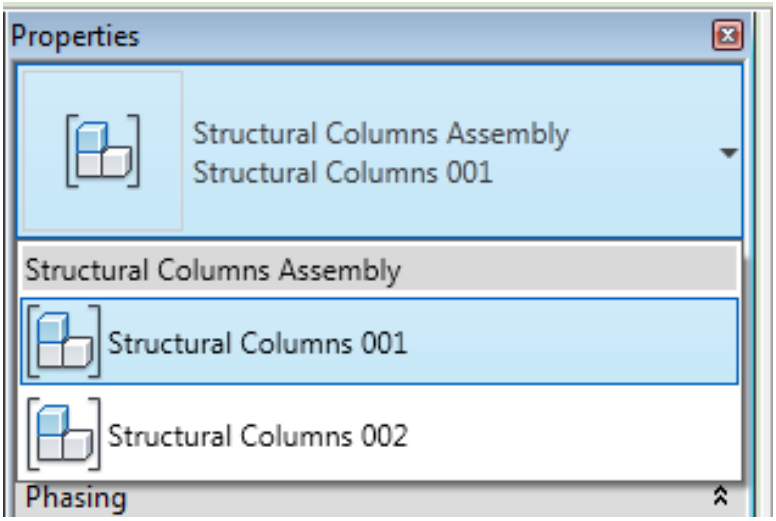
Enhanced Editing abilities

Elements can now be created and edited while in Edit Assembly Mode. You'll notice nearly all modeling tools on Structure and Architecture ribbon are available.



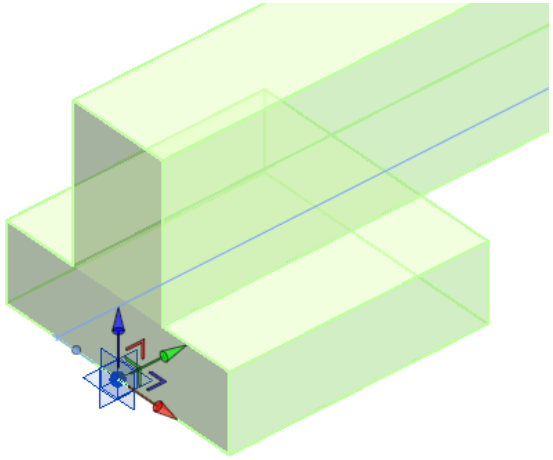
Switching Types

Similar to changing types for elements of other categories, you can change the type of an assembly to another type you have already created in your project using the Type Selector.



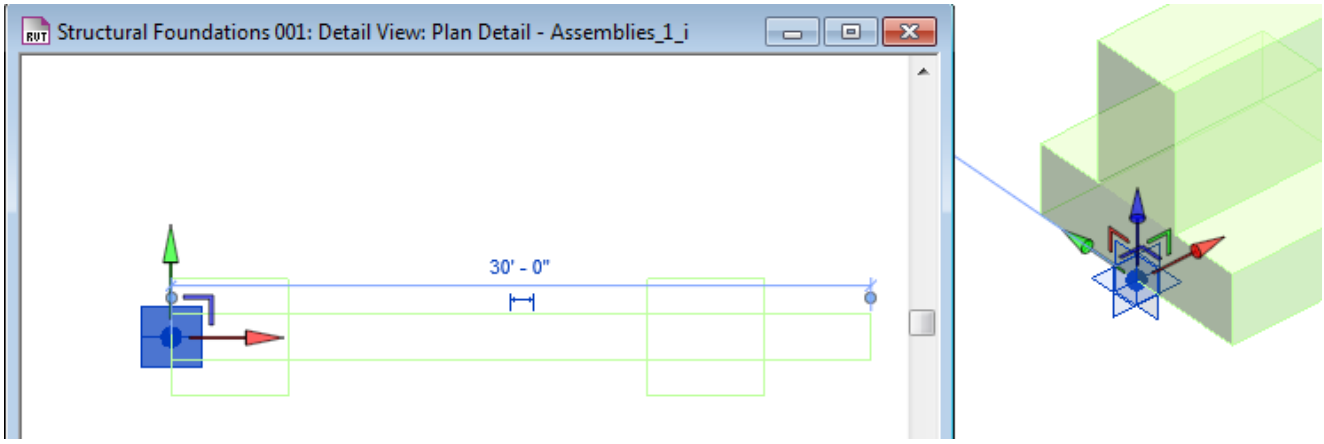
Assembly Origin

Visible by the point and the three blue planes.



You can drag the point or use the coordinates icon to move the origin, and use the Rotate tool from the Modify ribbon to rotate it.

- Determines the origin for switching assembly types.
- Sets the rotation of assembly views. (Assembly plan views will be oriented so that the green arrow from the origin's coordinate indicator points towards the top in plan view.)

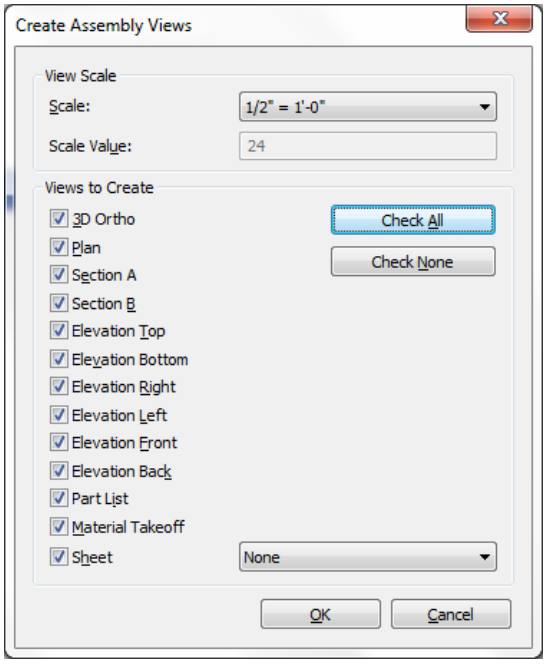


Relocating just the origin will propagate to all instances of that assembly type, however, if you already created assembly views, you will still have to rotate them manually or remake them.

Additional Views/ Last Used State

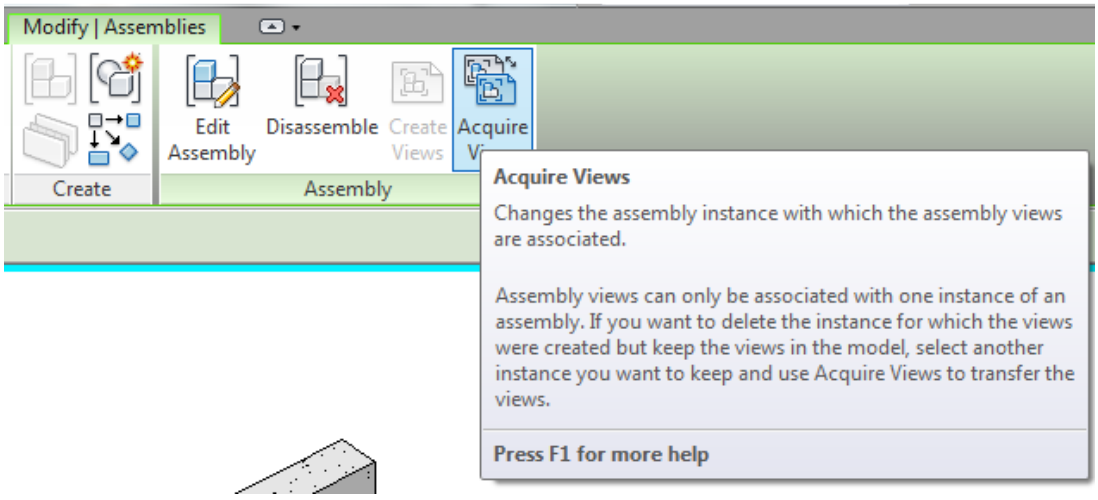
Can now create an elevation for any of the six sides, use Check All or Check none, and choose whether or not you want to create an assembly sheet.

The selection of views in this dialog will be remembered the next time you create assembly views for the project.

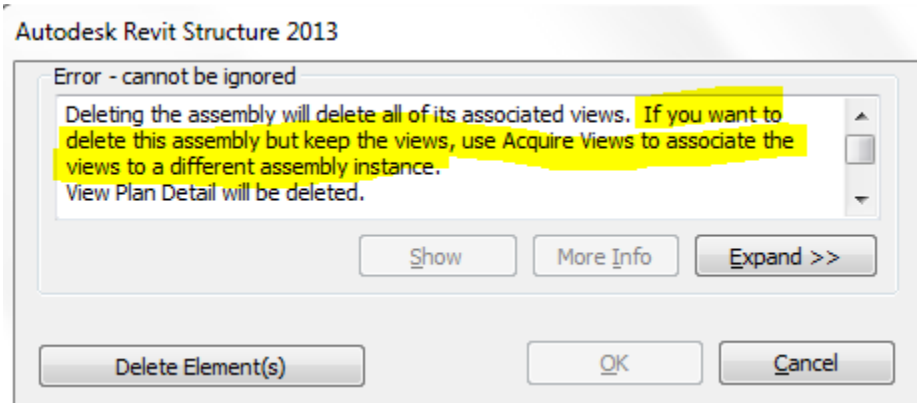


Transferring Views

Assembly views are applied to the instance of the assembly that they were created from. You can tell which instance the views were created from because Create Views will show up in the contextual ribbon when the assembly is selected. Otherwise Acquire Views will show. Consider Acquiring views to another instance of the assembly if you need to modify, disassemble, or delete the original assembly instance.



Always read the warnings when working with assemblies as new types can easily be created and views can be deleted or re-associated to a new assembly type.



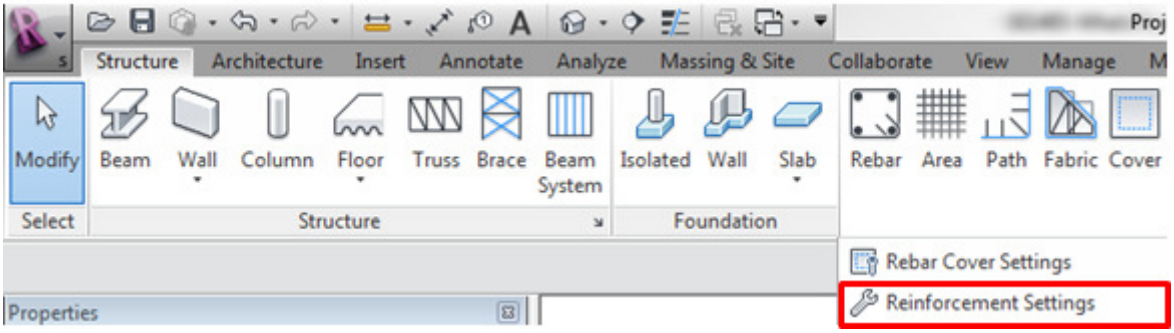
Place on Construction Sheets or Assemblies Sheets

You can now place assembly views on either the Assembly Sheet or your regular design documents under Sheets in the Project Browser. And you can place non-assembly views onto your assembly sheets

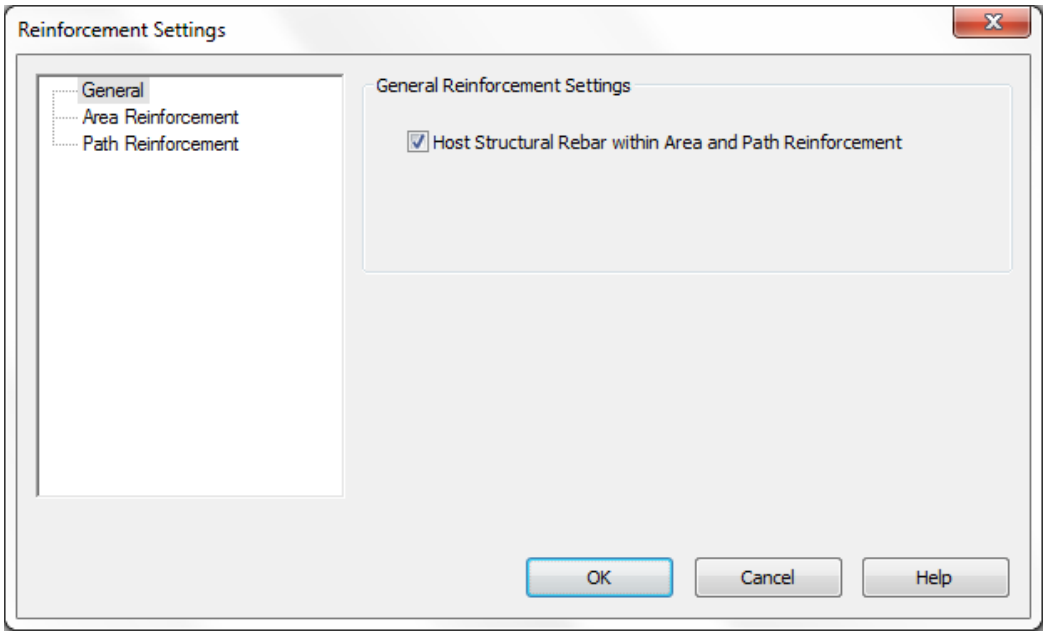
Reinforcing

Hosted Area and Path Reinforcing

From the Structure ribbon> Reinforcement panel pulldown> Reinforcement Settings.

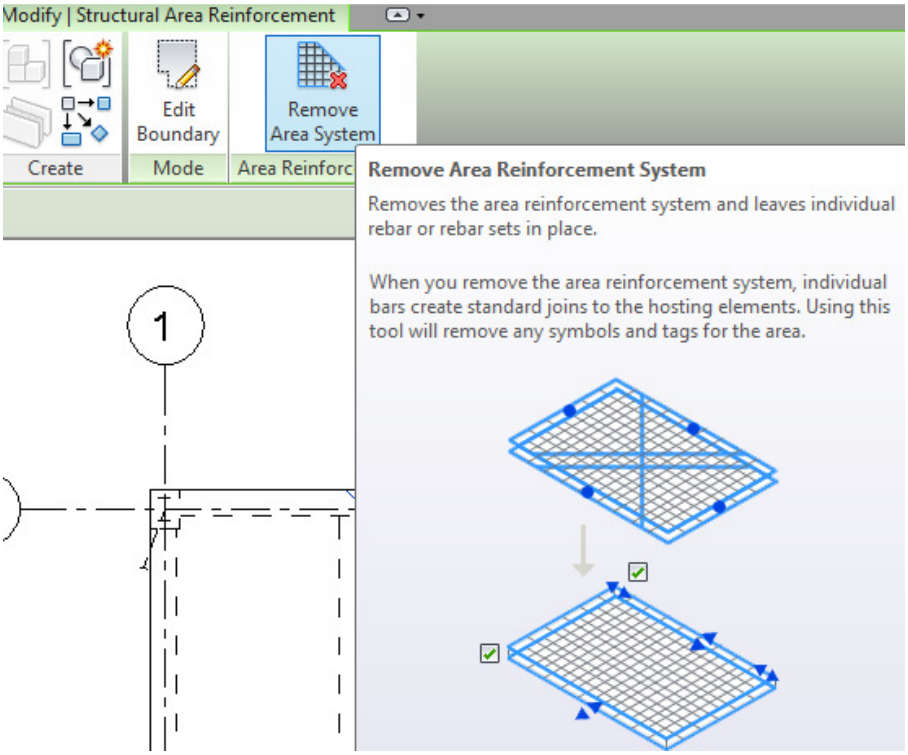


In the General Options, you can choose whether to host actual rebar elements within the area and path reinforcing similar to how beam systems and trusses host structural framing members, which you can then schedule and create rebar sets with. Or, you can choose to not host them, in which case you will only see representation of them when you cut a section view similar to previous versions.



The default option is now to host the rebar. If you upgraded an older project to Revit '13 that already had area or path reinforcing placed, hosting will not be checked. This setting is applied to all area and path reinforcement elements in the entire project and cannot be changed after elements have been placed.

Once Area or Path Reinforcing has been pace, select the boundary. In the contextual ribbon is Edit Boundary along with the new option to Remove Area/Path System.



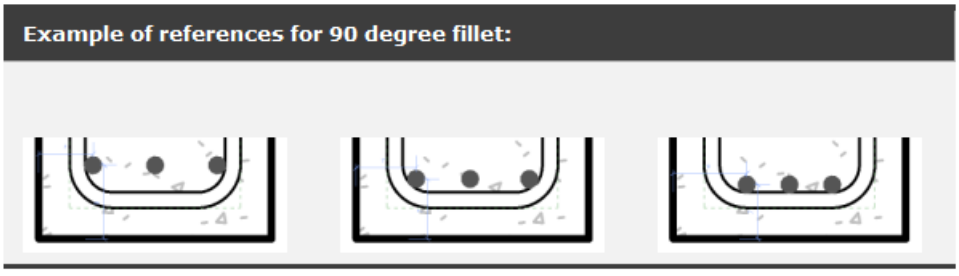
When you remove the Area or Path reinforcing system, all rebar sets will be shown individually, as if you had placed them with the Rebar tool instead of the Area/Path tool. You can then modify each set's size, spacing, and layout individually.

Rebar Snapping

Rebar will now snap into position either at the midpoint or tangent point of fillets or hooks.

Wikihelp:

- For fillets - the references are placed at points of tangency and at the mid-point of the fillet arc.

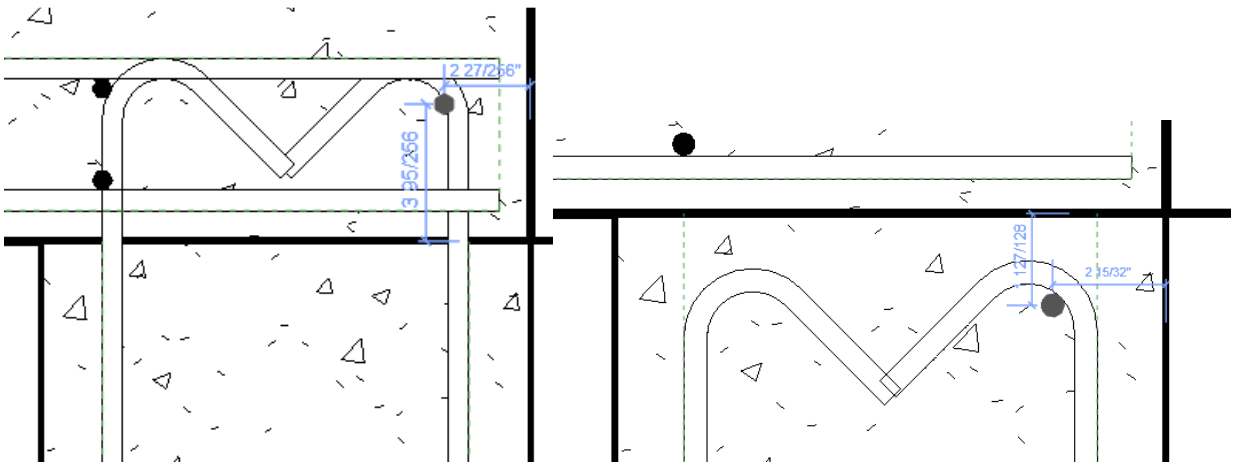


- For hooks - the references are placed at the point of tangency with the rebar segment, at the point of tangency with the hook extension and at cardinal points between them.

Example of references for 135 degree hook:

Note After modifying properties of rebars or reinforced elements snapping to the references is preserved and adjusted to modified settings.

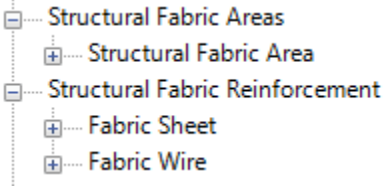
These snaps are not available if the new rebar is placed within a different element than the fillet or hook was placed in. In the images below, the rebar cage was placed in the beam so when I place a single bar at the hook (within the slab) I do not get the snaps. I can move the hooks down into the beam, and try placing the single bar again and the snaps will now work that the bar is being placed within the same elect the rebar cage/hook was placed.



Structural Wire Fabric

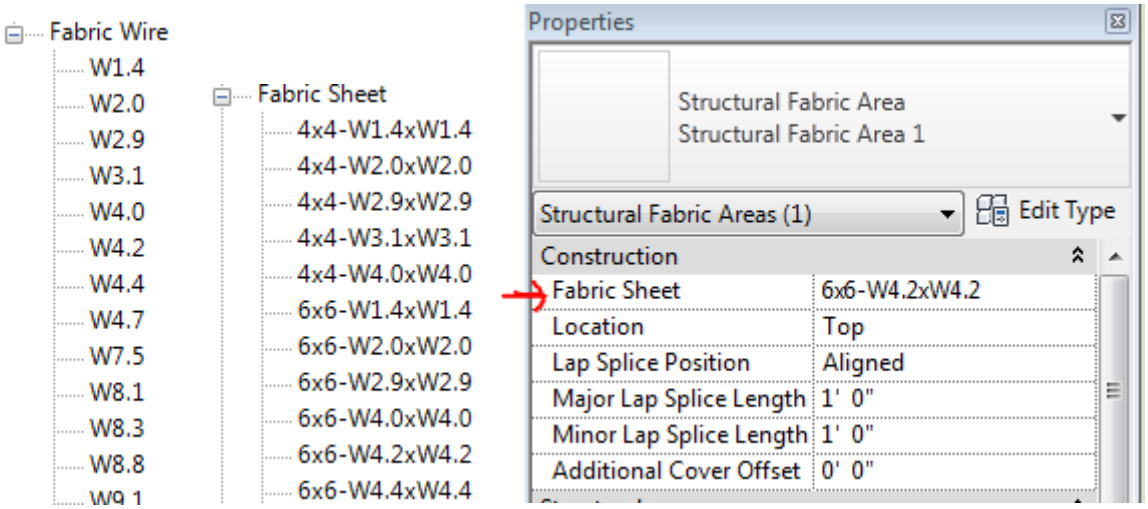
The Fabric Reinforcement is made up of two types of elements: Fabric Wire and Fabric Sheets. Within the Fabric Sheets, you choose the type of Fabric Wire to use. The Fabric sheets are then laid out to create the overall Fabric Reinforcement.

You'll see these two new categories and their families in your Project Browser

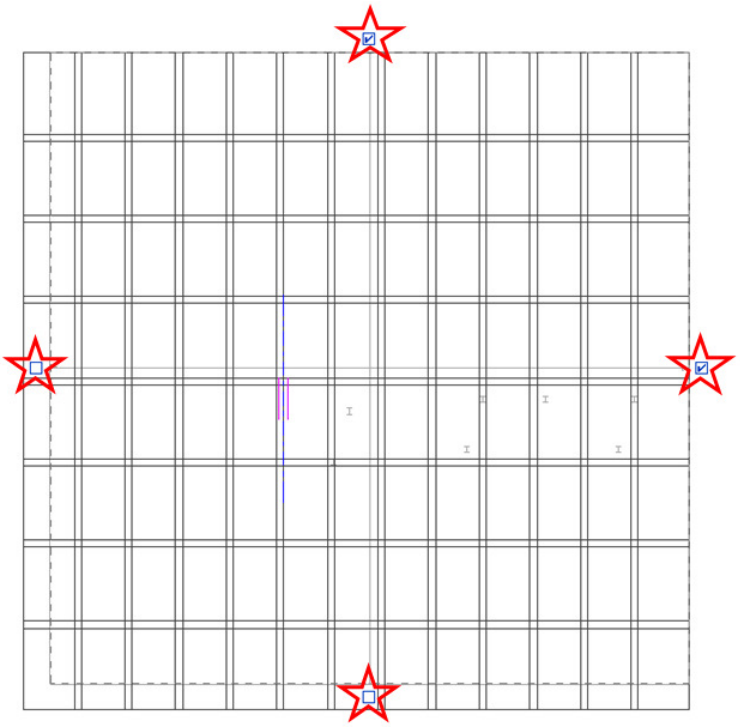


These are system families, and so the types must be created within the project environment. Expand these in the default Revit template to see the types already created.

The type of Fabric Wire is set in the Fabric Sheet Type Properties.. and the Type of Fabric sheet is then set in your Structural Fabric Area properties.

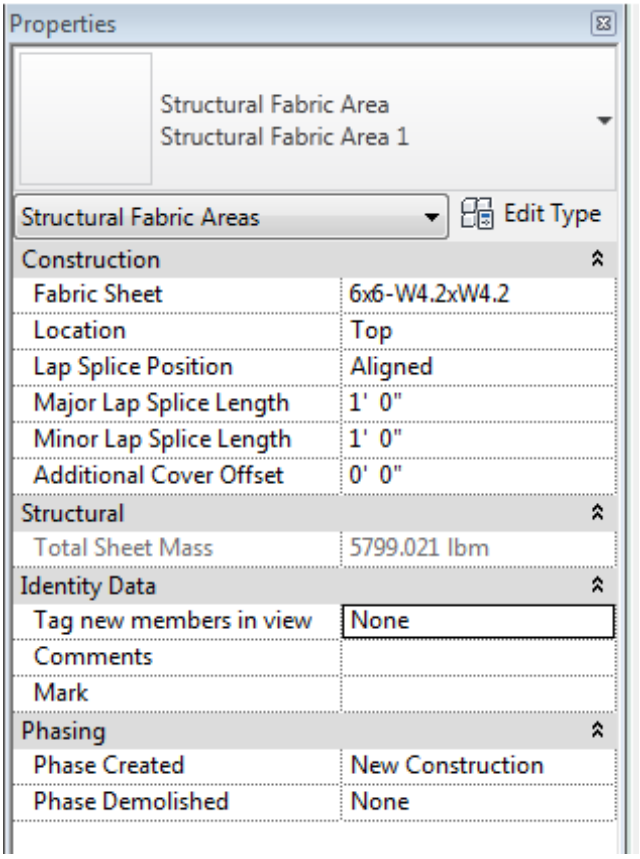


To Create a Structural Fabric Area … Structure ribbon> Reinforcing panel > Fabric.
Revit prompts you to Pick Structural Floor or Wall for Fabric Area Reinforcement. Then sketch the area to be reinforced.



Check Boxes will appear along each edge of your sketch. These checkmarks indicate where the Ending Edges of the sheets will be placed. You can select as many Ending edges or as few as 2 neighboring edges.

Let's look at the other Properties of Structural Fabric Area.



Location: Top or Bottom (Based upon your floor or wall's rebar cover settings) but can also include an amount in **Additional Cover Offset**

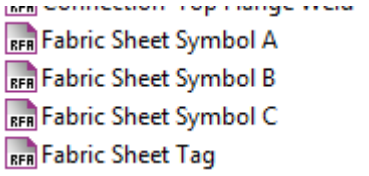
Lap Splice Position:
Aligned - lap-splices in both directions to be in line with each other.
Half Way Stagger - staggers the rows so that the sheet of the next row is placed at the halfway point of the row before it.
Passing Stagger - starts each row with a full sheet, alternating between the left and right sides.

Major/Minor Lap Splice can be different from the default (1'-0") if you haven't checked multiple boundary edges as Ending Edges.

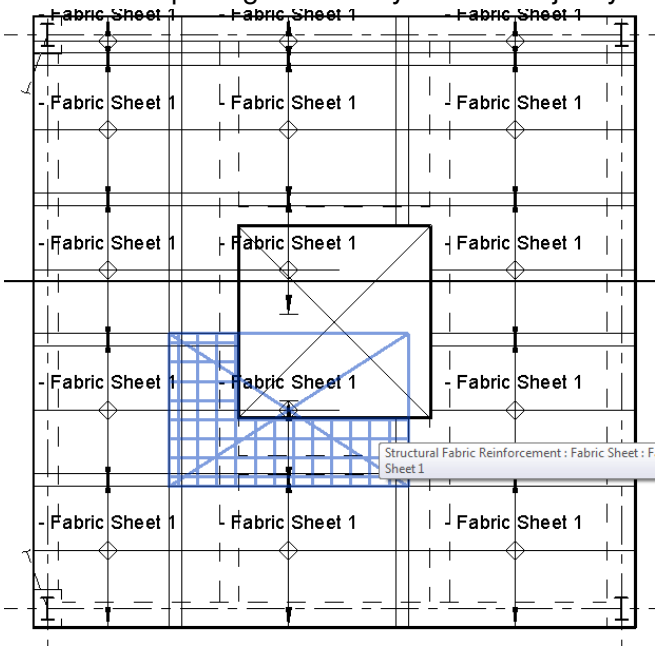
And choose which view to tag new members in.

To place the Fabric Reinforcement Symbol manually, Click Annotate tab ▶ Symbol panel ▶ Fabric Reinforcement Symbol... And then tag as necessary. Add a mark to be used within your Schedule

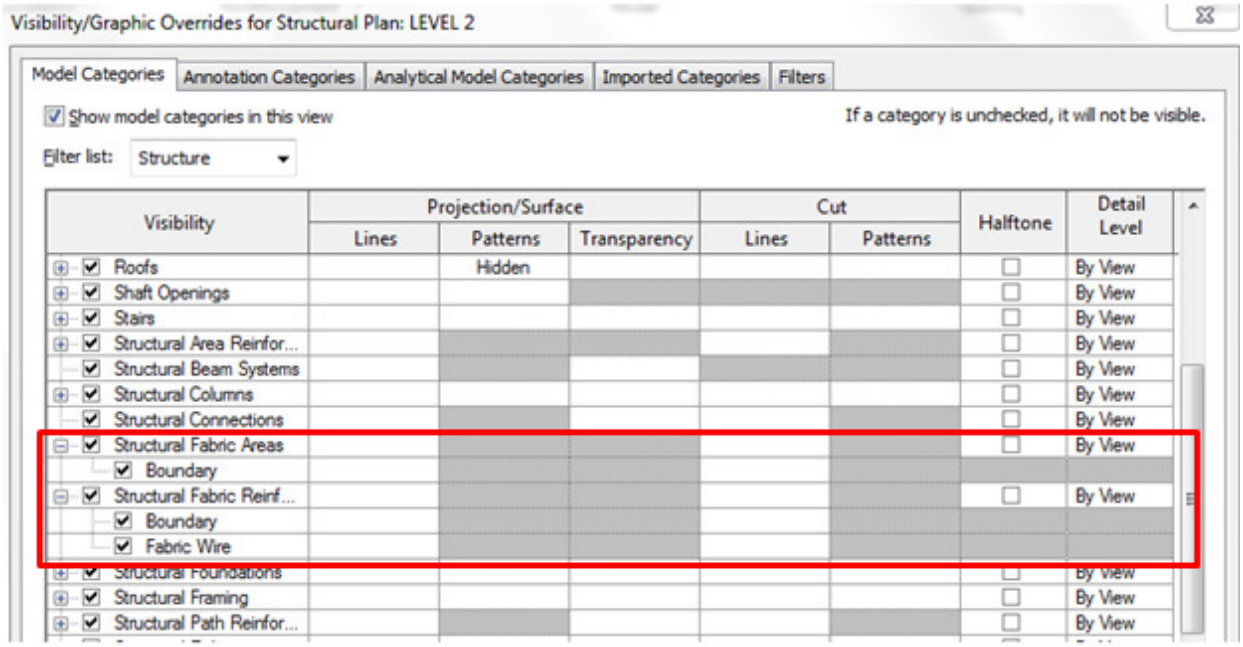
Three Symbols and a tag come with the content library



Fabric Sheets will update for most openings. You may need to adjust your symbols and tags.



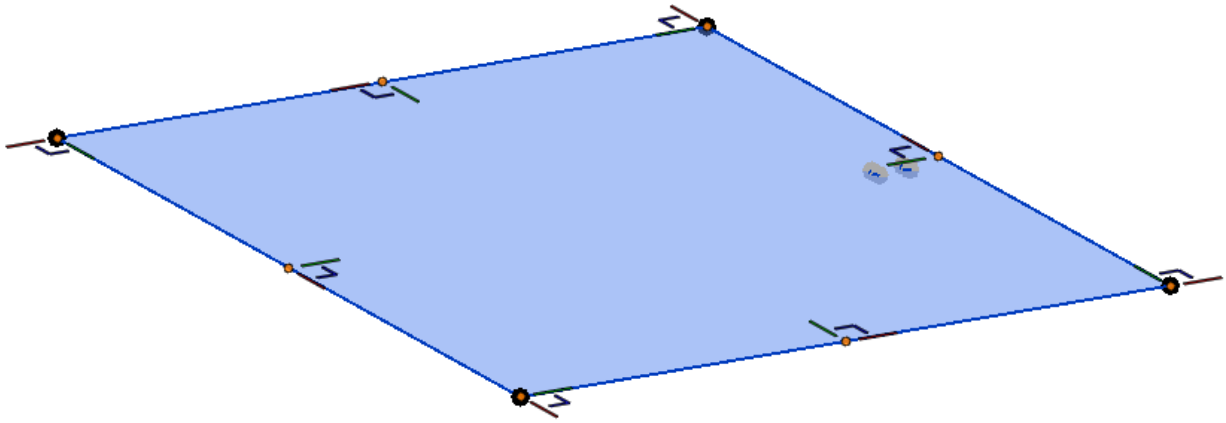
In the Visibility Graphic Overrides, under Structural Fabric Areas, you can turn off the boundary or the Fabric wire from being shown. You could also turn off the Structural Fabric Area boundary. Remember, if you turn off the entire category the annotations for that category will no longer appear.



Analytical Model

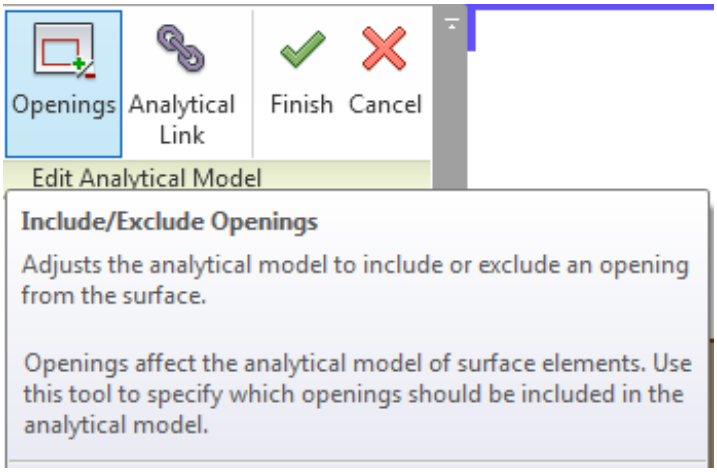
Floor/Slab manipulation

While in Analytical Adjust mode, a coordinate axis now appears on each edge and each corner of an analytical floor/slab element. The slope can be maintained as you adjusted edges on sloped elements.

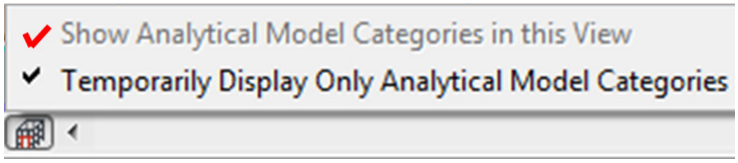


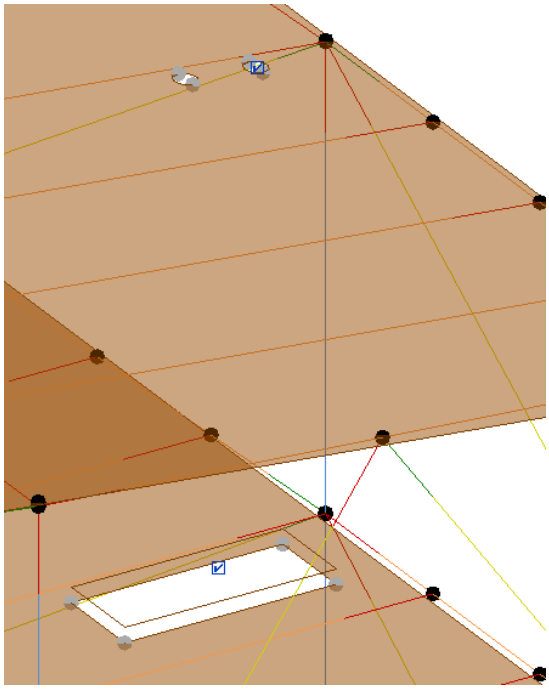
Ignore Openings

The Opening tool from the Edit Analytical Model floating panel enables you to include or exclude an opening from the surface of the analytical model for floors, slabs, roofs and walls.



Note you cannot be working with only “Temporarily Display Only Analytical Model Categories” selected. You must have “Show Analytical Model Categories in this view” checked or have the analytical categories checked on in Visibility Graphics for the opening tool to work properly.





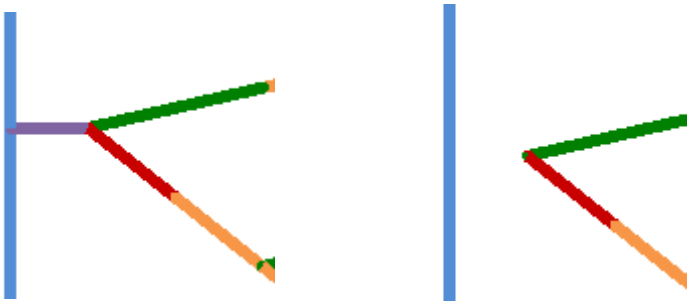
When I click the Openings tool, a check mark is shown at each opening location. Once I uncheck it, the opening is filled in.

*Note that multiple openings created within the same opening sketch will only have one checkbox for enabling and disabling them within the analytical model. (The two circles, i.e. roof drains, at top created in same opening sketch)

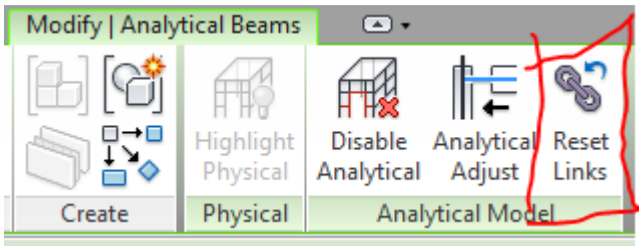
Analytical Links (Previously Rigid Links)

An analytical Link is an Element connecting two separate analytical nodes. You can still create analytical links (rigid links) between columns and beams in their properties.

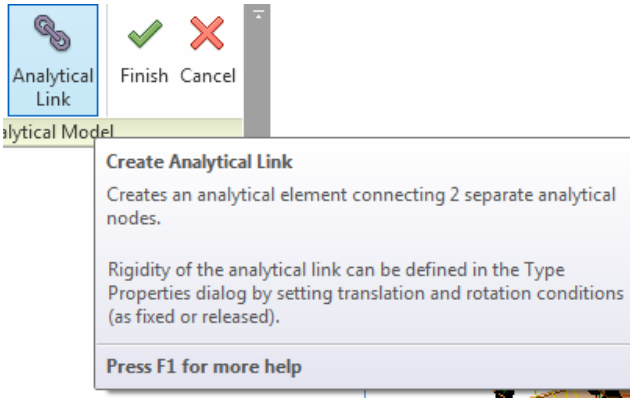
You can now tab-select and delete individual Analytical Links created ‘automatically’ by allowing them in the properties.

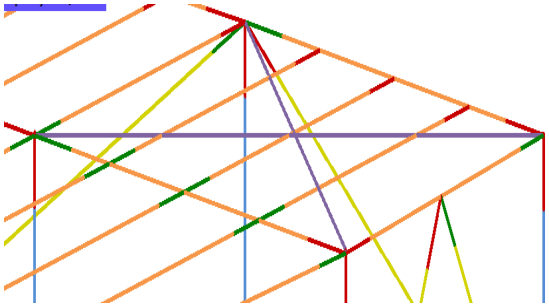


If the results are not desired, you can select the analytical beam and the Reset Links tool will be available in the contextual ribbon.

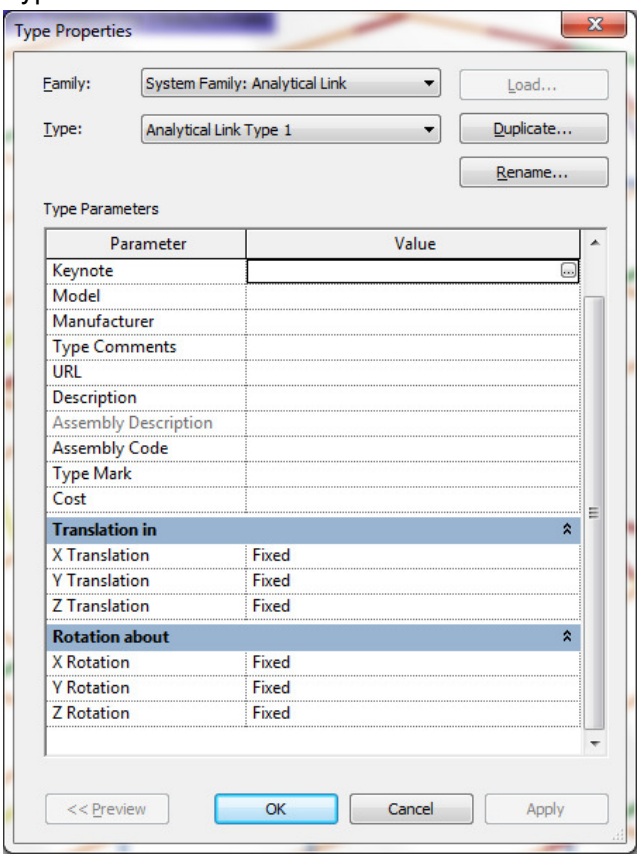


The Analytical Link tool in the Edit Analytical Model floating panel allows you to manually add analytical links between any two endpoints. Such as creating a rigid diaphragm, or at more specialized beam to column join conditions. Analytical Links show as purple lines in the default template.



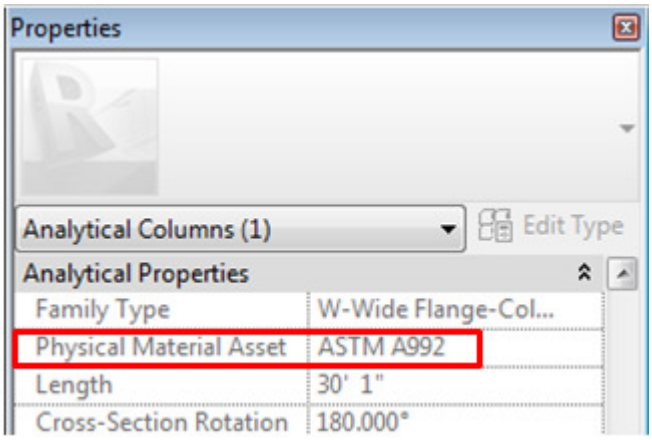


You can define their rigidity (fixed or released for Translation and Rotation) by creating additional analytical link types.

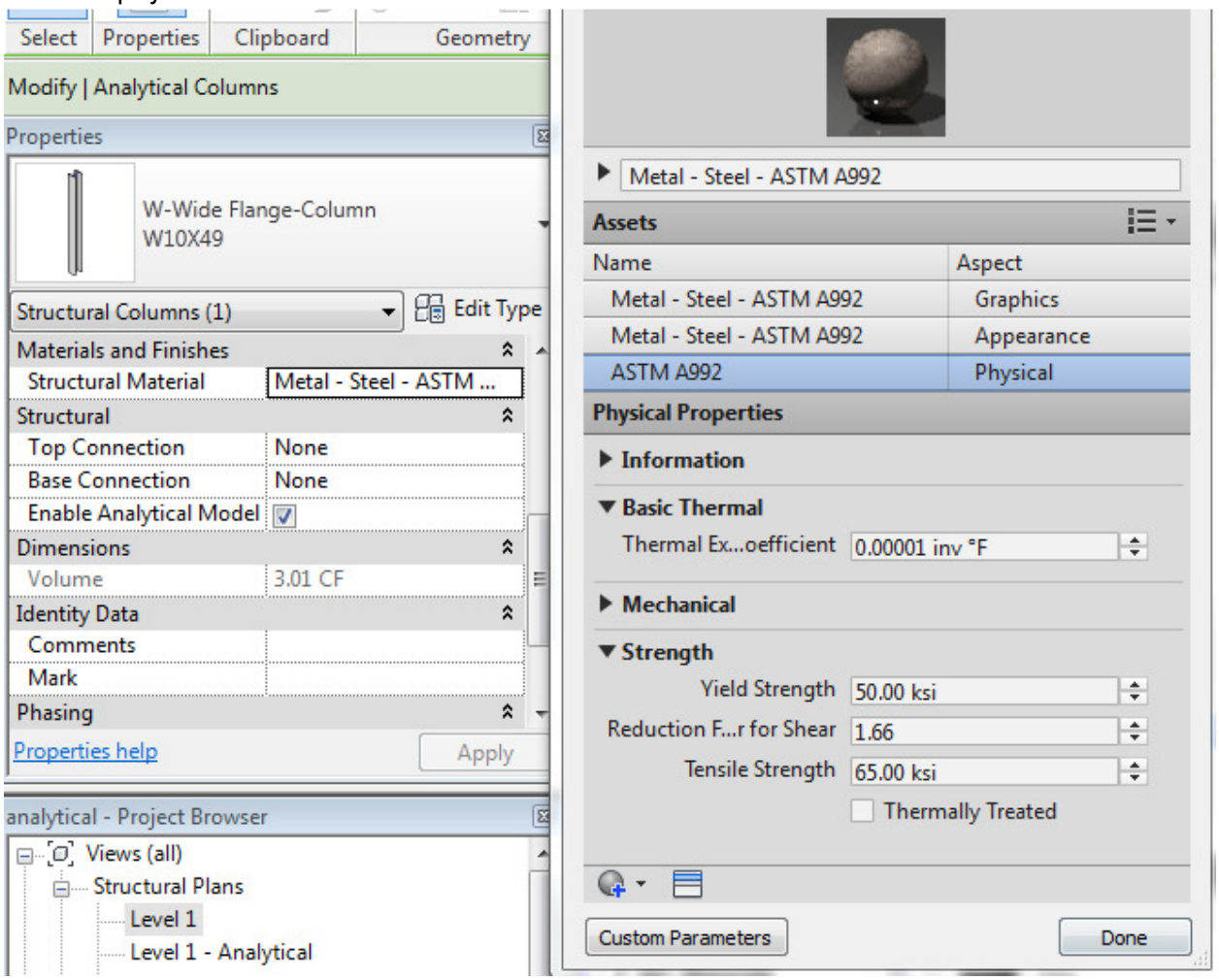


Physical Material Asset

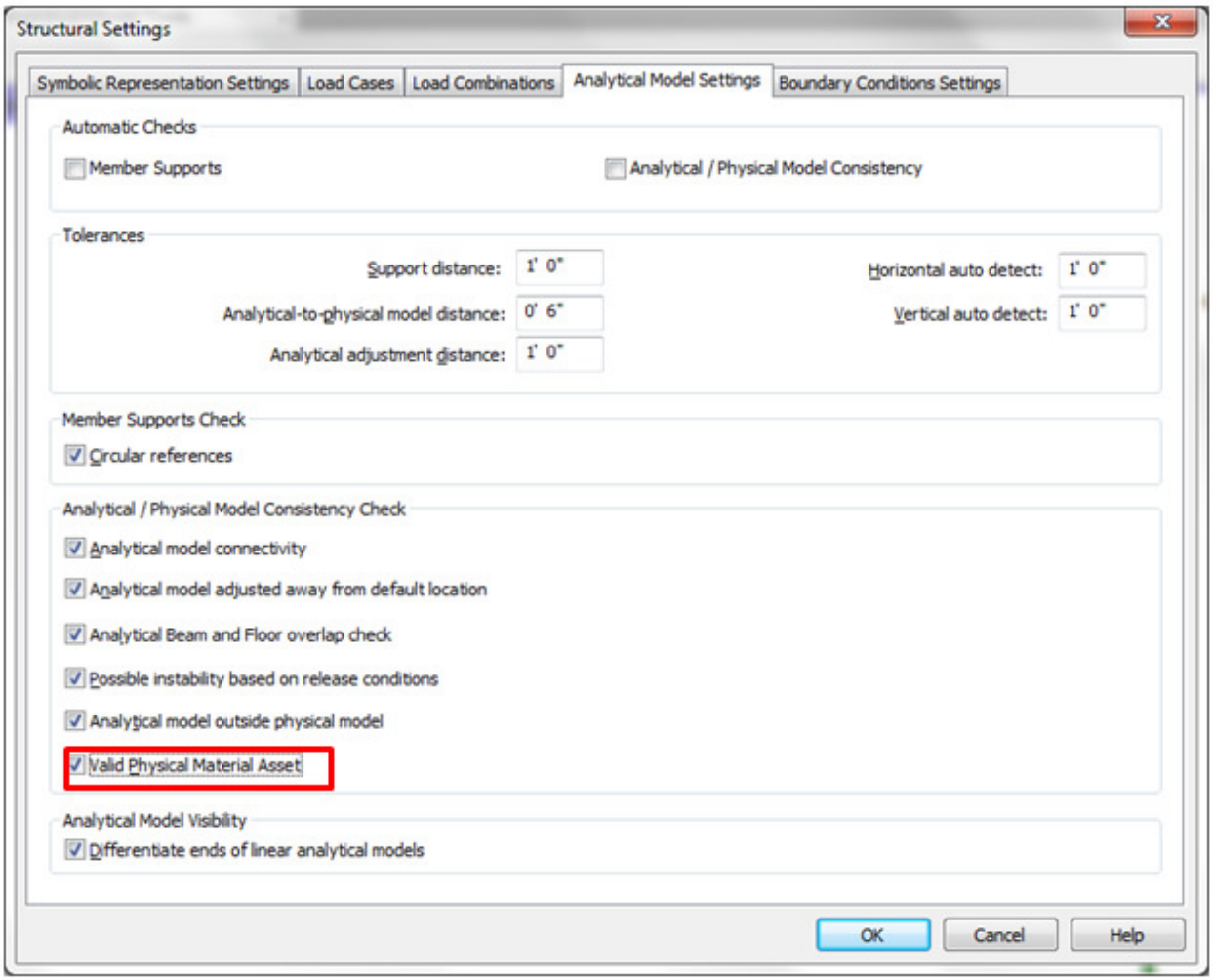
In the Analytical Properties for each analytical element is Physical Material Asset.



The physical material asset includes the thermal, Mechanical, and Strength properties of the material that can be exported to your analysis software. This information is being pulled directly from the physical model's Structural Material.

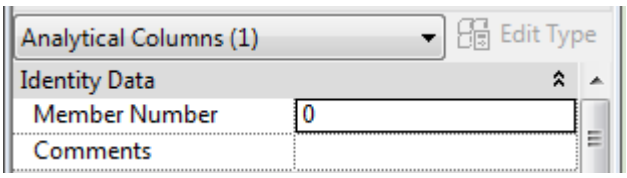


To ensure that the Physical Material properties are exported out to your analytical software you can turn on the Valid Physical Material Asset check.



Analytical Element ID Number and Comments

With an analytical element selected, and starting from the top of the Properties palette, we have Member/Node/Surface Number and Comments. Typically, the Number information would come when you import your model back in from an analysis software, and depending on which one you use, the results may vary. You can add a comment about this analytical element, which can then be scheduled so you can revisit it later.



Load Combinations

Can check the option to “Show third-party generated load combinations” to see any combinations that had been imported into Revit from an analytical software, or from a third-party add-in that automatically generates load combinations.