48-749 Parametric Modeling
Lecture 6

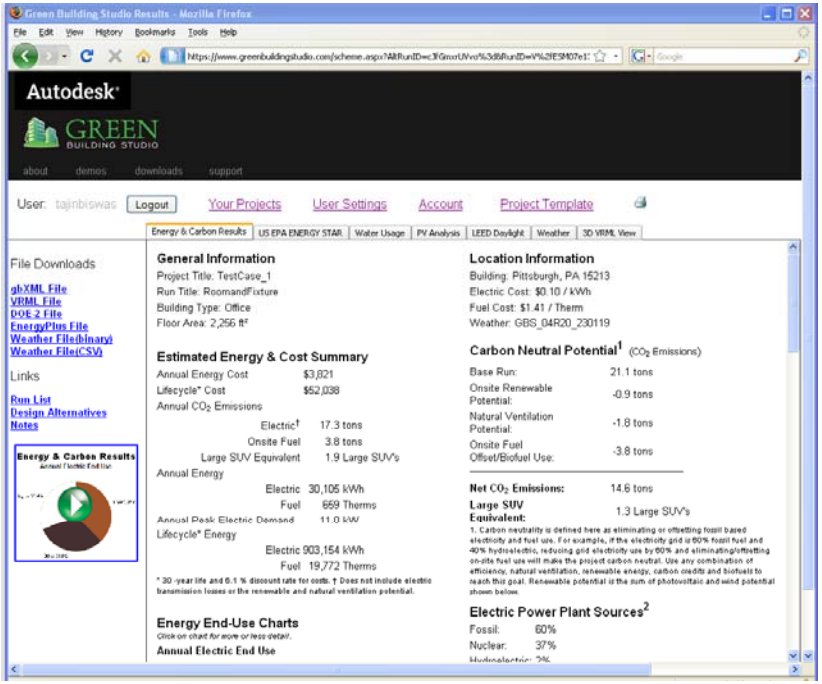
Carnegie Mellon University
School of Architecture

Lecture 5

- Bim used in Energy Simulation
  - Green Building Studio
- Families Continued
- 3D Families
  - Nested Family
  - Linking Parameters
- Curtain Wall System
  - Mullion
  - Grid
  - Panel

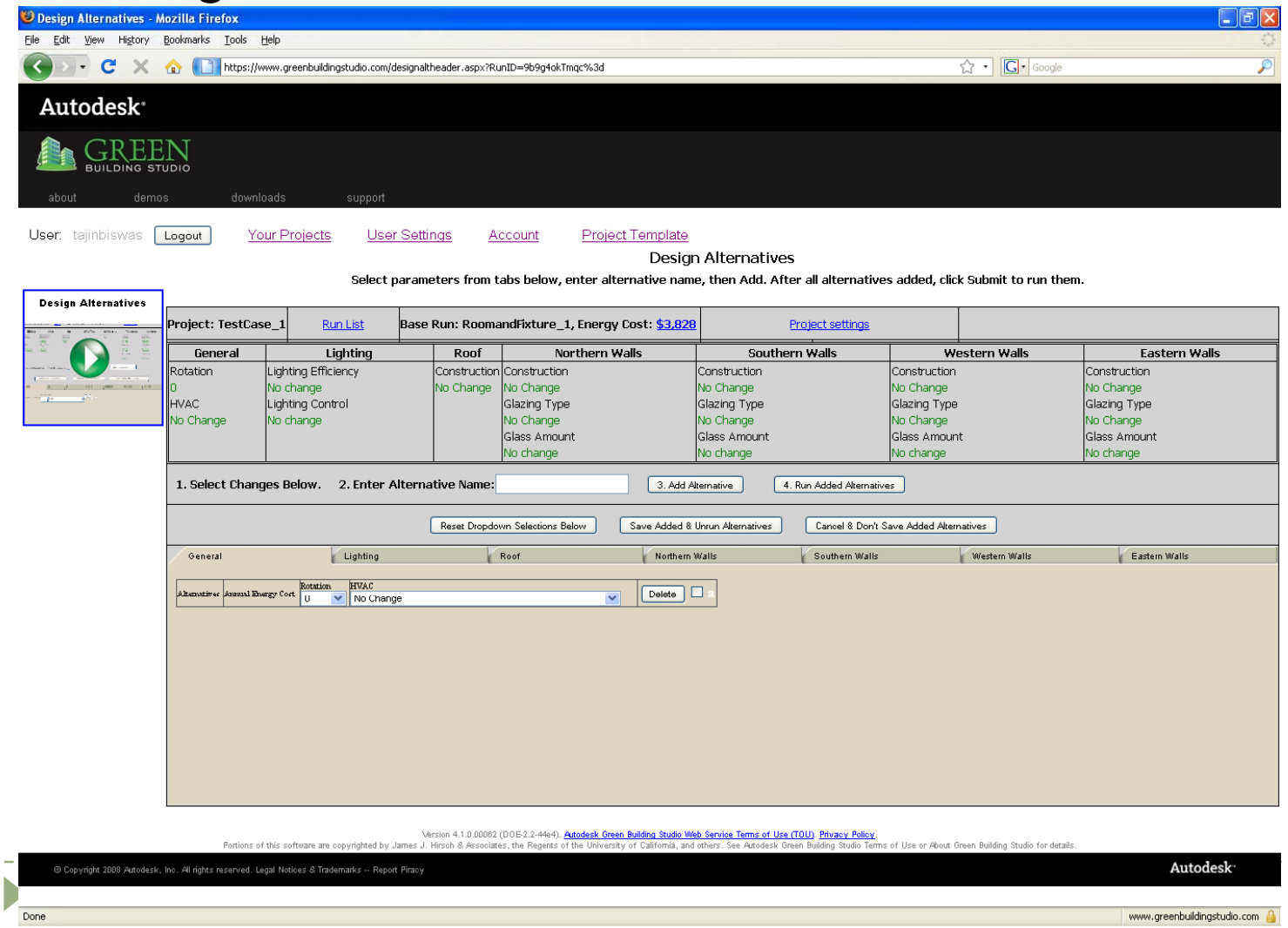
Energy Calculation in GBS- Report

- Annual energy cost.
- Lifecycle energy costs (30 year).
- Annual energy consumption (electric and gas).
- Peak electric demand (kW).
- Lifecycle energy consumption (electric and gas).
- CO2 emissions are based on the on-site fuel use and the fuel sources for the electricity in the region.



Energy Calculation in GBS- Report

- Design Alternatives



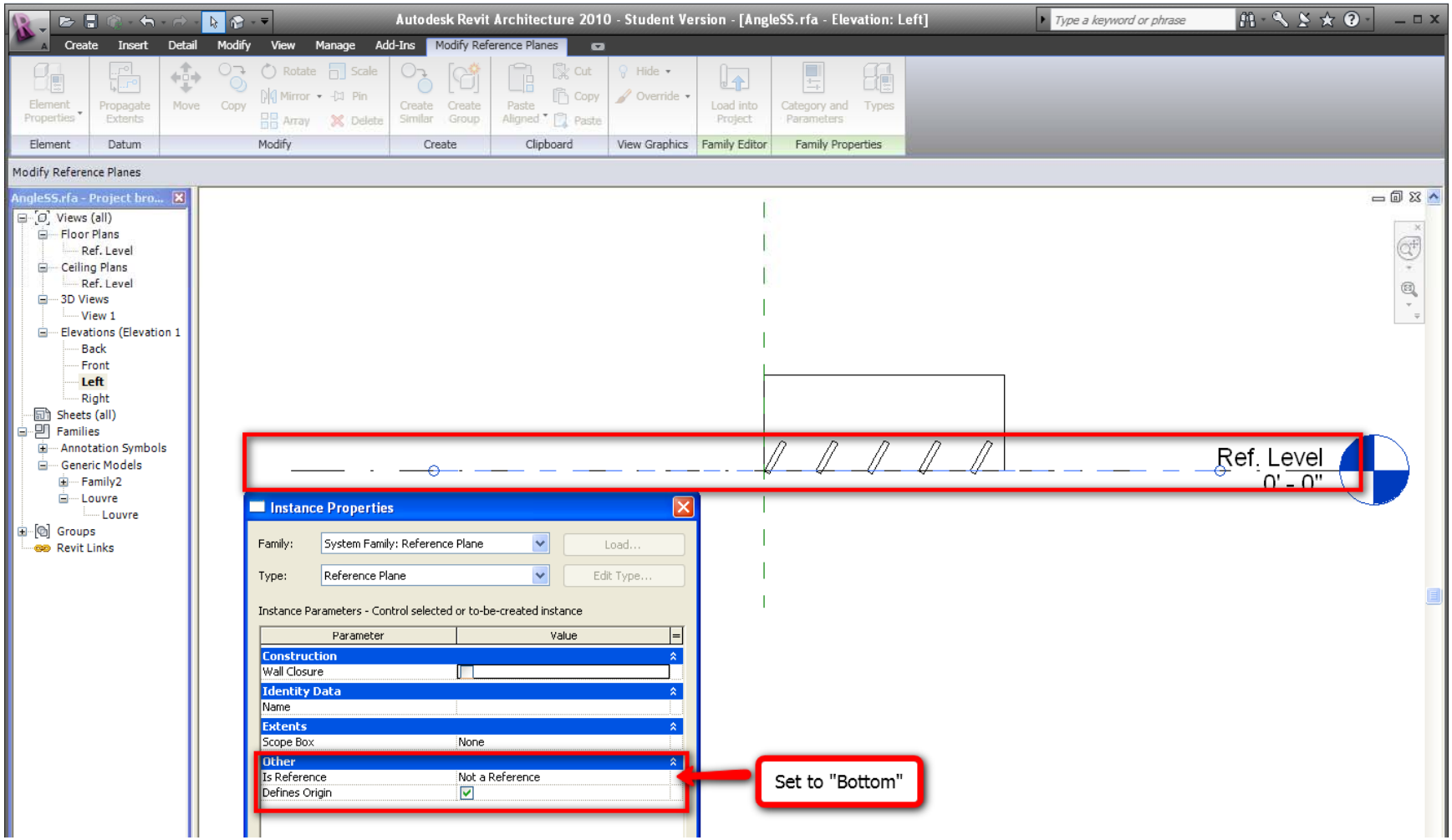
Families Nested – Creating a louvered Window

- Nest Families
- Linking Parameters
- Use formula to lock in design intent

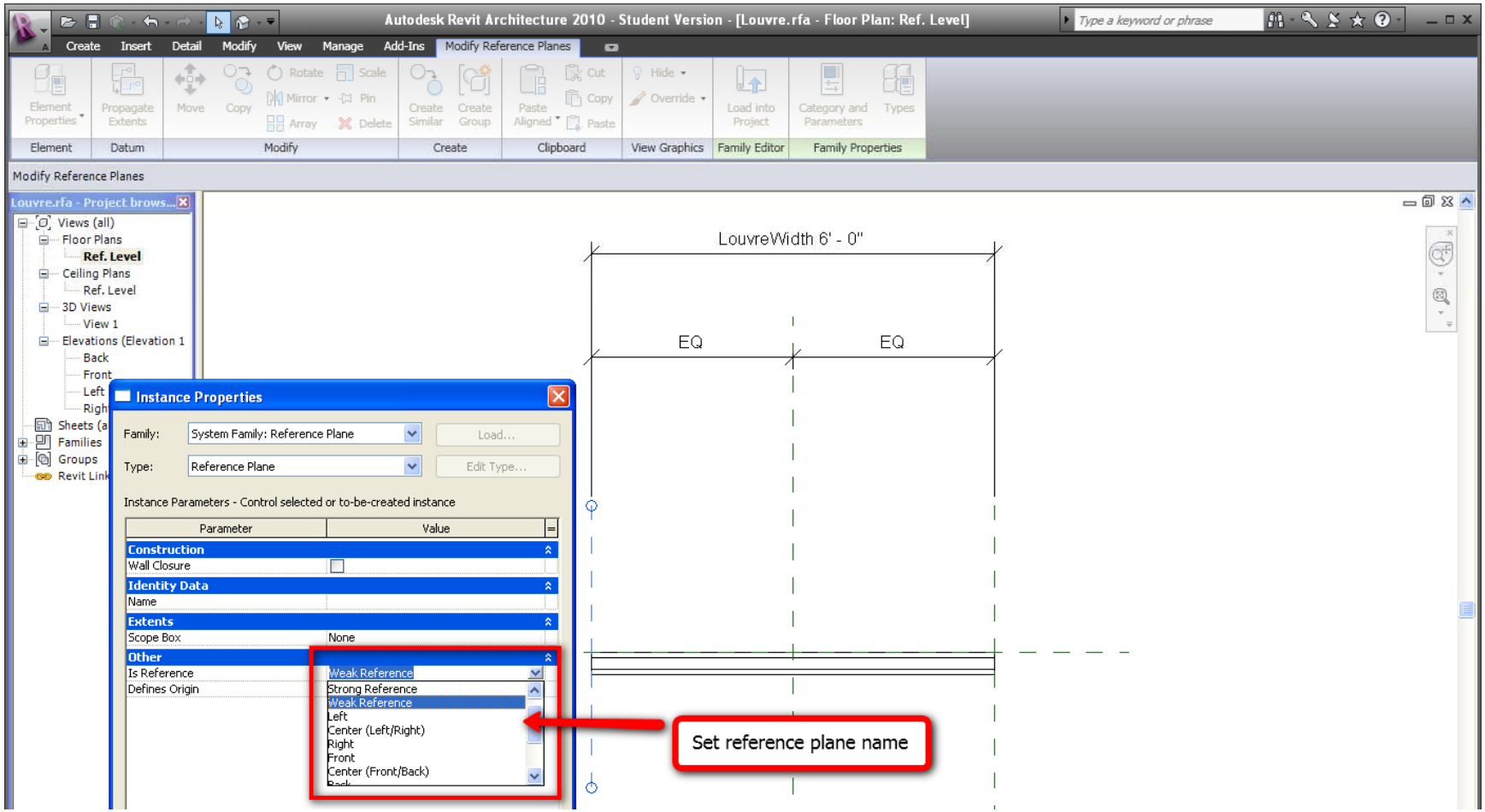
Families Nested – Points to remember

- Use Nested families when using arrays
- Always constrain the two defining elements of the array in all 3 axes. *(Defining elements are both the first and second or first and last depending on which option you've selected when creating your array).*
- The bottom reference plane is set to be “Not a Reference” by default. This needs to be set to be reference “bottom” when using nested families otherwise you’ll have difficulties constraining the element in elevation.

Families Nested – Set Reference planes

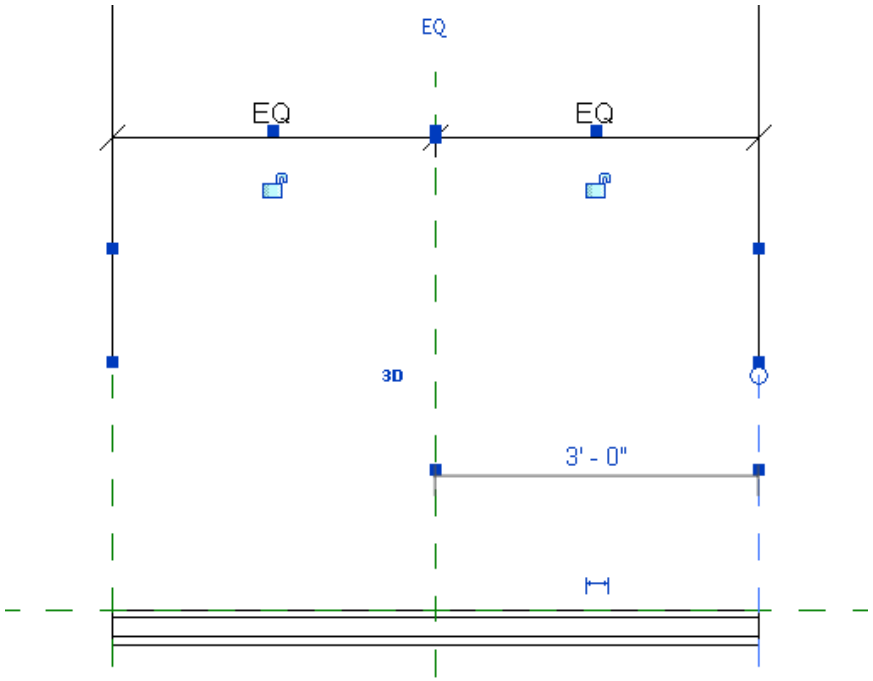


Families Nested – Set Right/Left ref planes



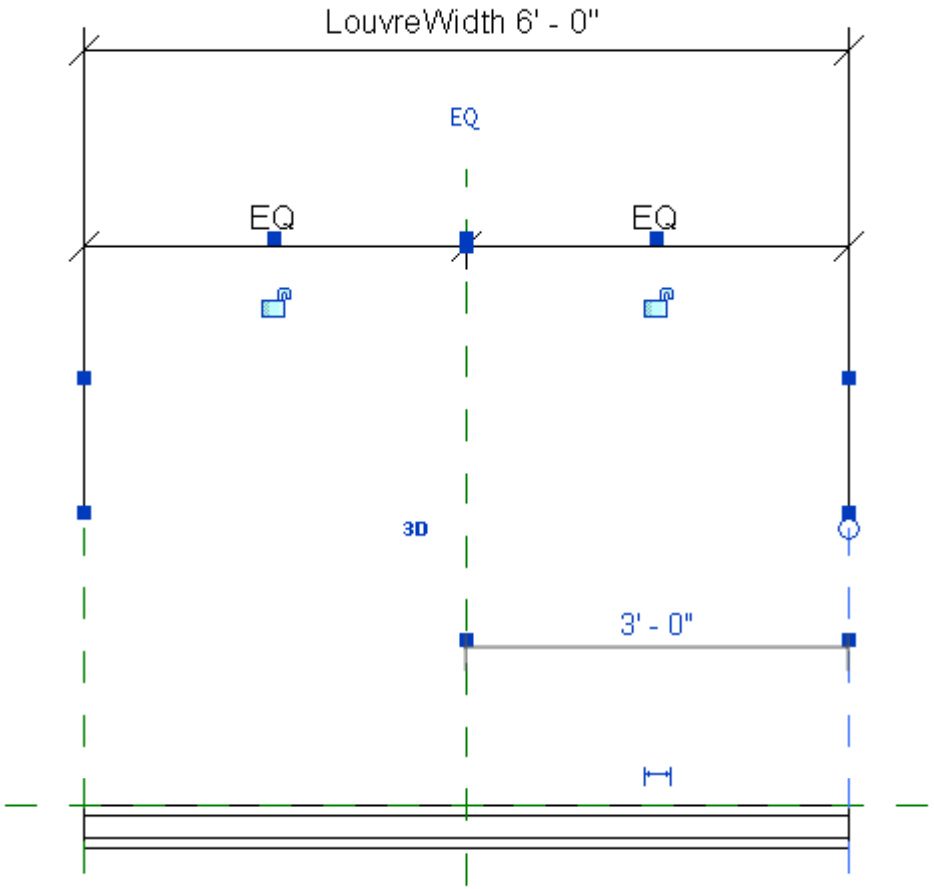
Families Nested –

- Begin by Opening Revit select FILE>NEW>FAMILY>Generic Model.rft
- Place two reference planes left and right of center reference plane and assign the names
- With the dimension tool dimension in one string and then equalize.



Families Nested –

- Add Parameter with the dimension tool called LouverWidth
- Create Solid with Sweep on the center line

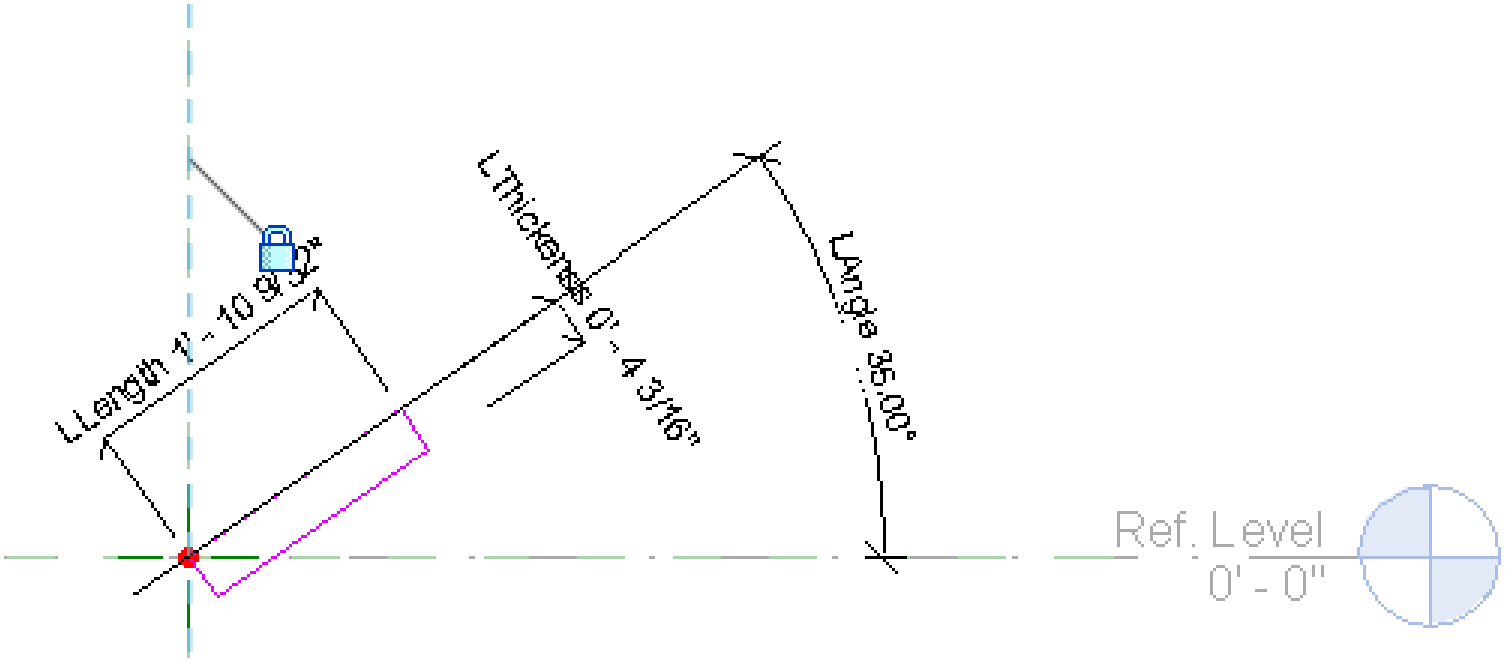


Families Nested –

- Select “sketch 2D path”. Now draw a horizontal line for the path going from the left to right reference plane on top of the centre (front/back) reference plane as seen in the picture below
- By using align lock the path to the right and left ref planes before finishing path

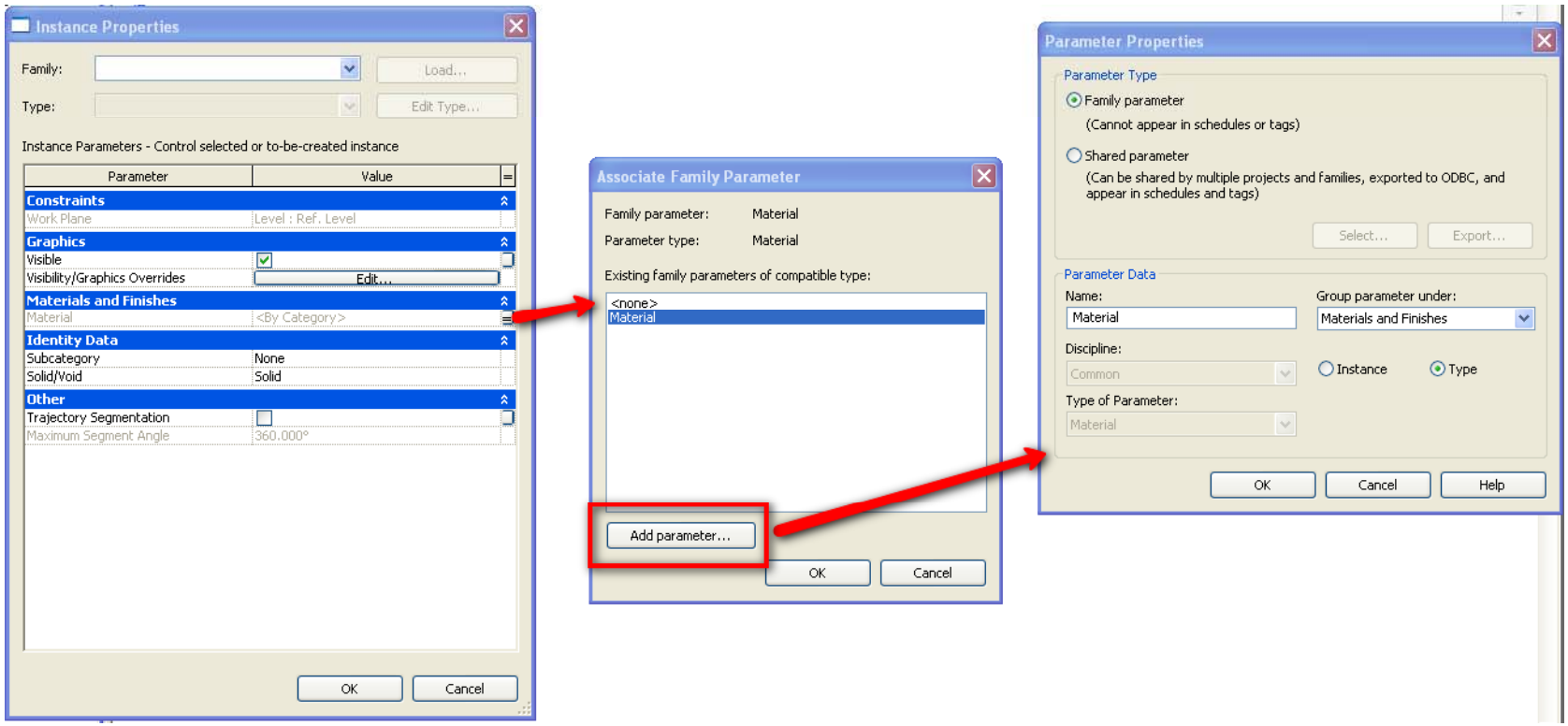
Families Nested –

- Draw profile from the left/right view and before finishing profile, add dimensions and lock rotation point to origin of reference planes by using the align tool
- Finish sweep, test the parameters



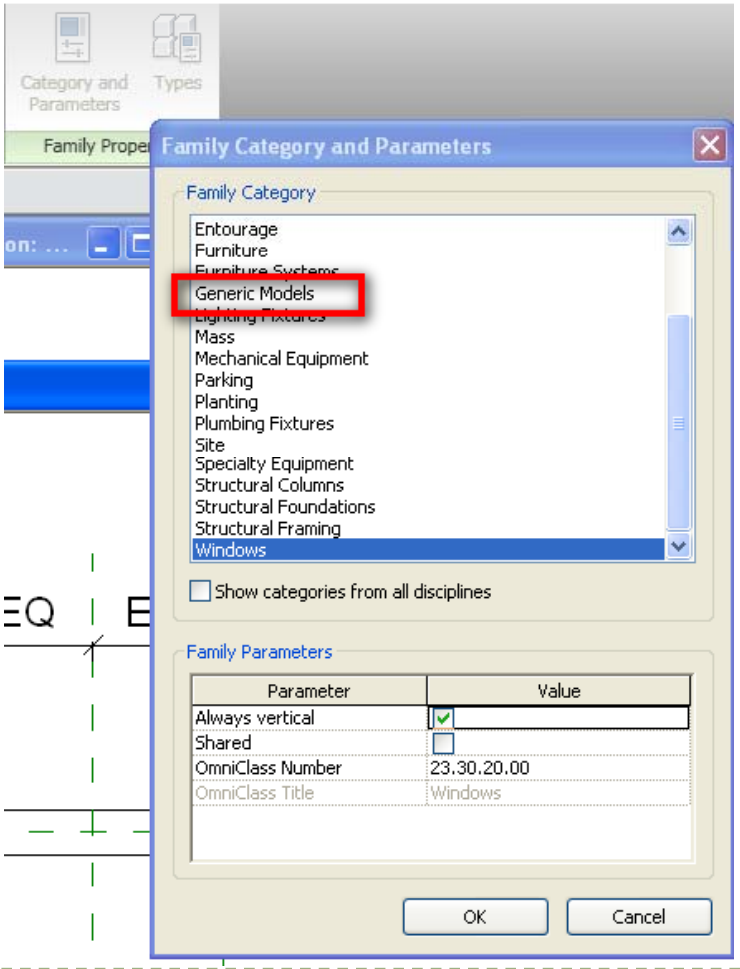
Families Nested –

- Adding a material parameter
- Next open a window.rft template as a host to put in the louvers



Families Nested –

- Select Category and Parameters to set Family Category, this is how the it will show in a schedule

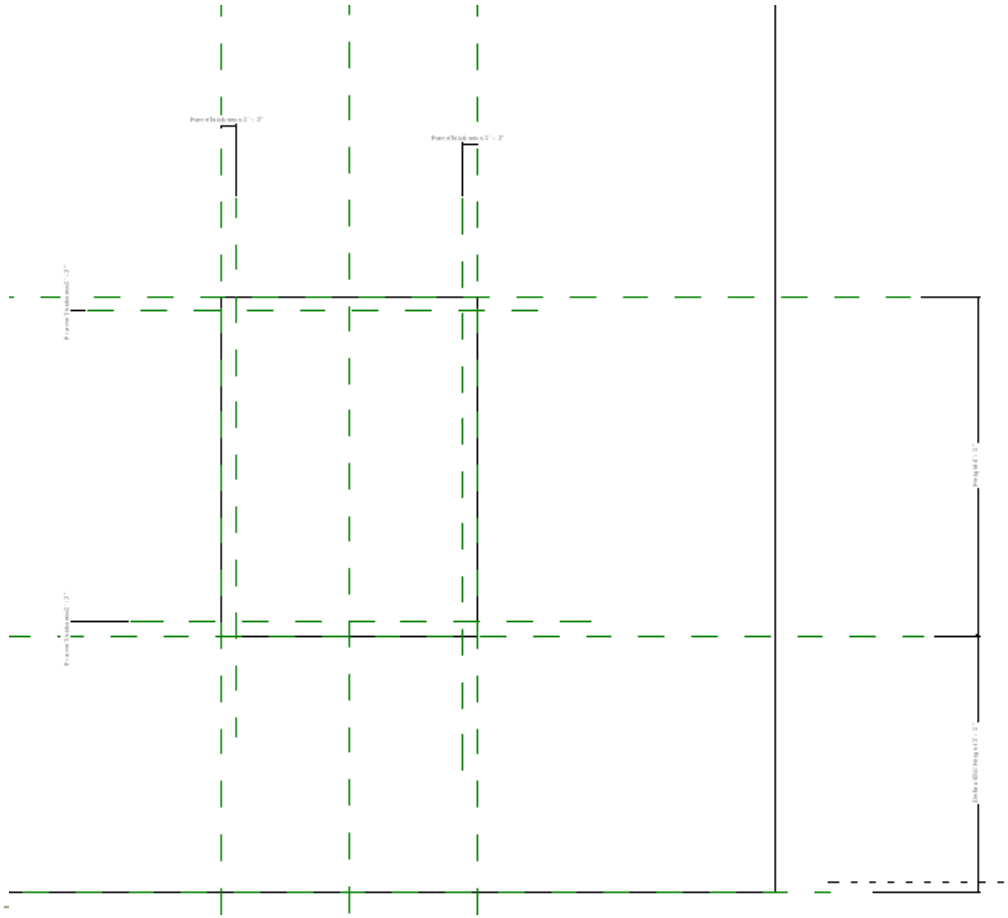


Families Nested –

- As a general rule always create parameters off reference planes then constrain geometry to the reference planes.
  - This tends to be the most reliable method for creating families and usually results in a reduced number of parameters.

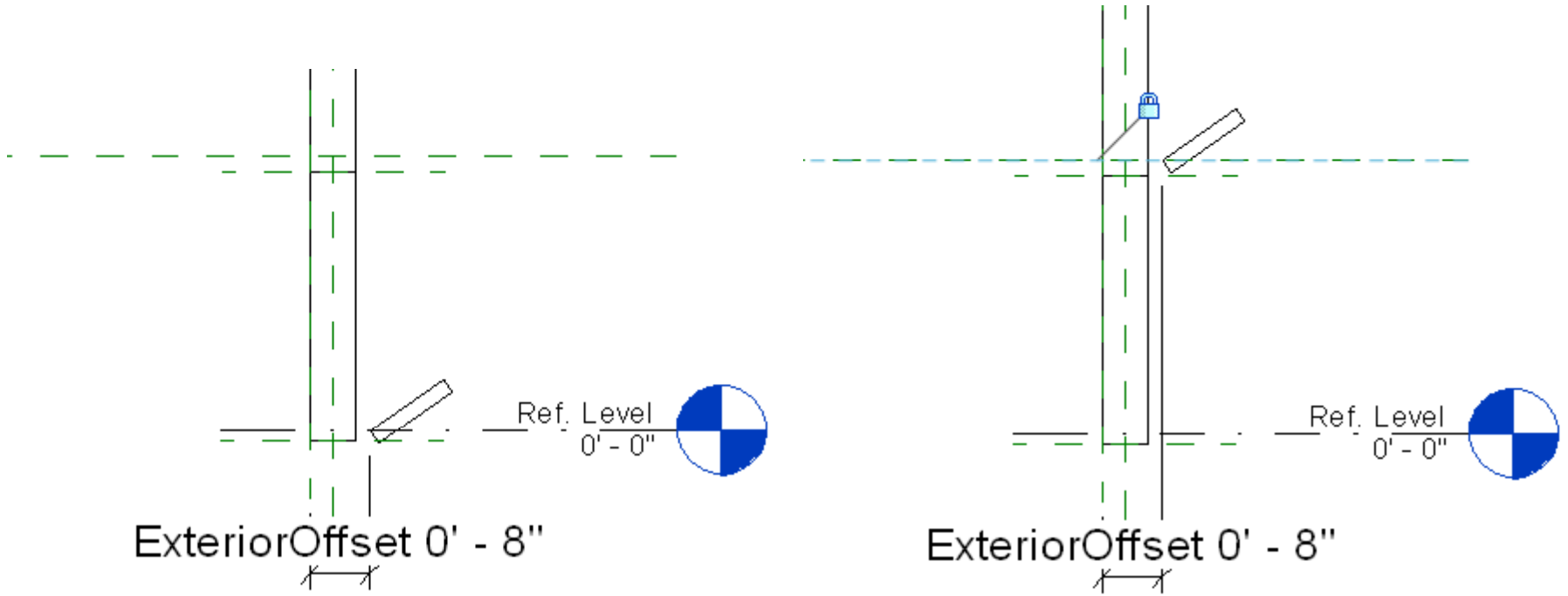
Families Nested –

- Begin with the interior elevation and add the reference planes, dimension them and add parameter for frame width



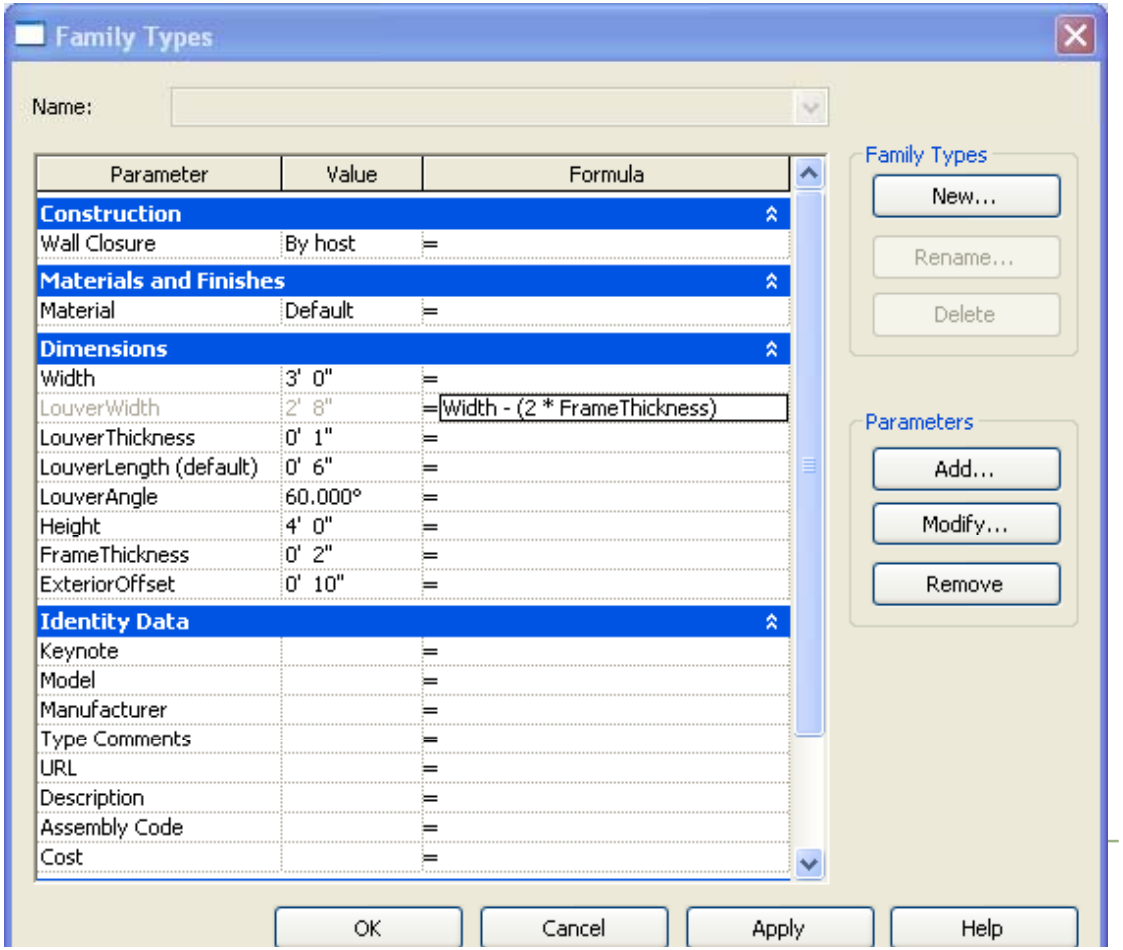
Families Nested –

- Add Exterior reference plane and add parameter ExteriorOffset
- Note where the Louver is located, it must be aligned to the sill level using the align tool and locked



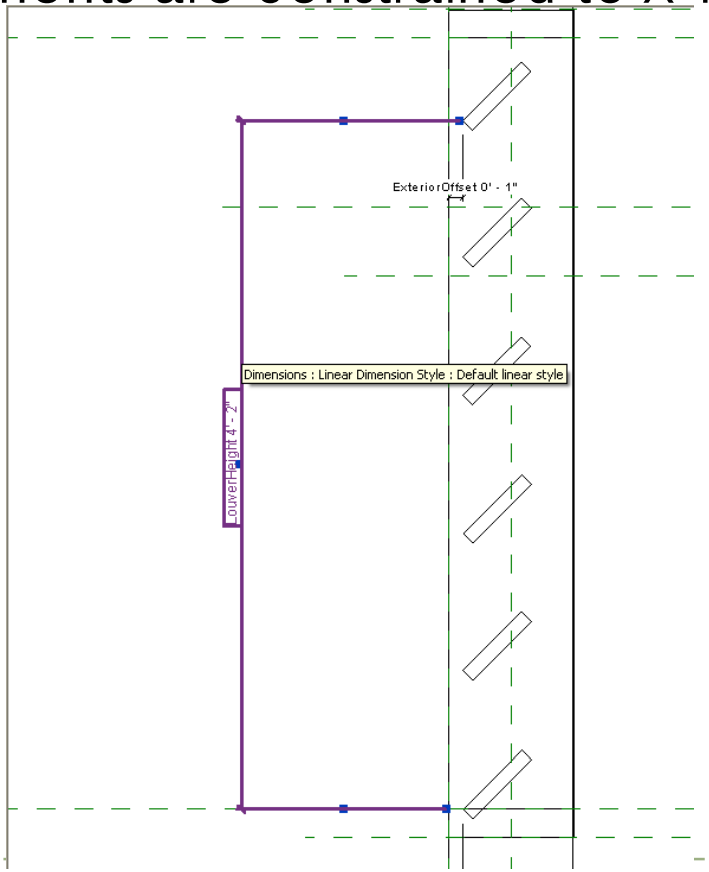
Families Nested –

- Add parameters and link the parameters of the louver component
- Add formula for Louver width



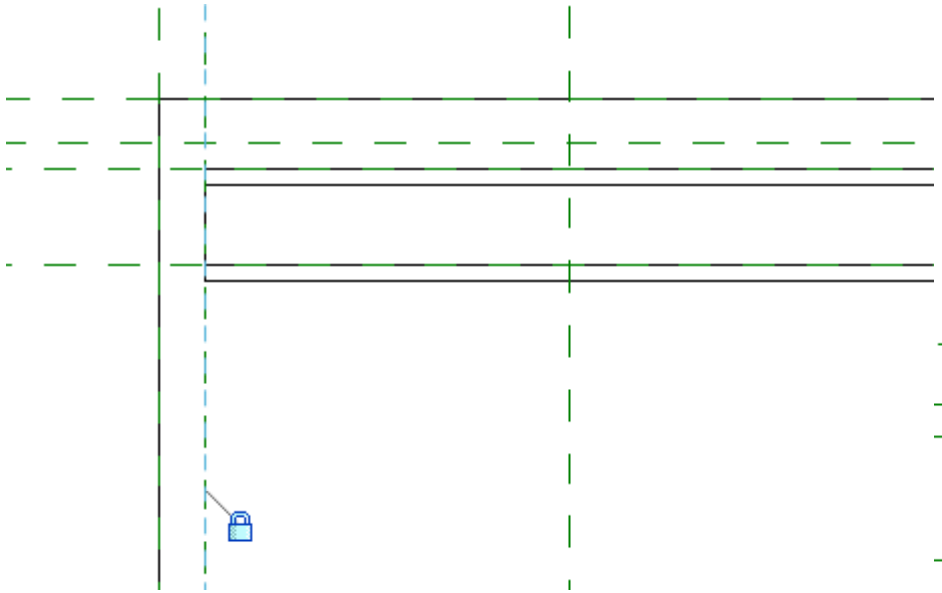
Families Nested –

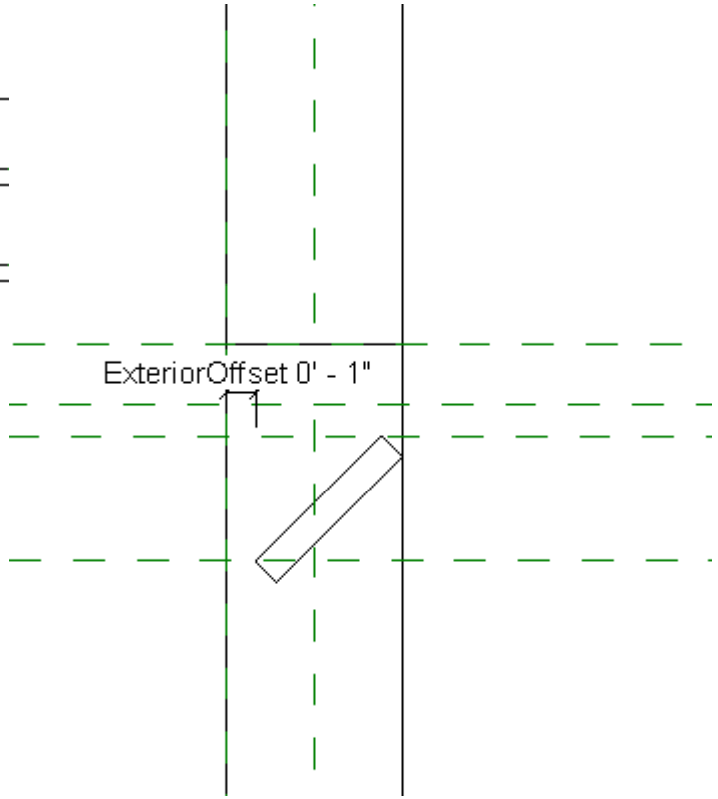
- Array the louver component
- Create two reference planes and call it LouverHeight
- Make sure the components are constrained to X Y and Z axis



Families Nested –

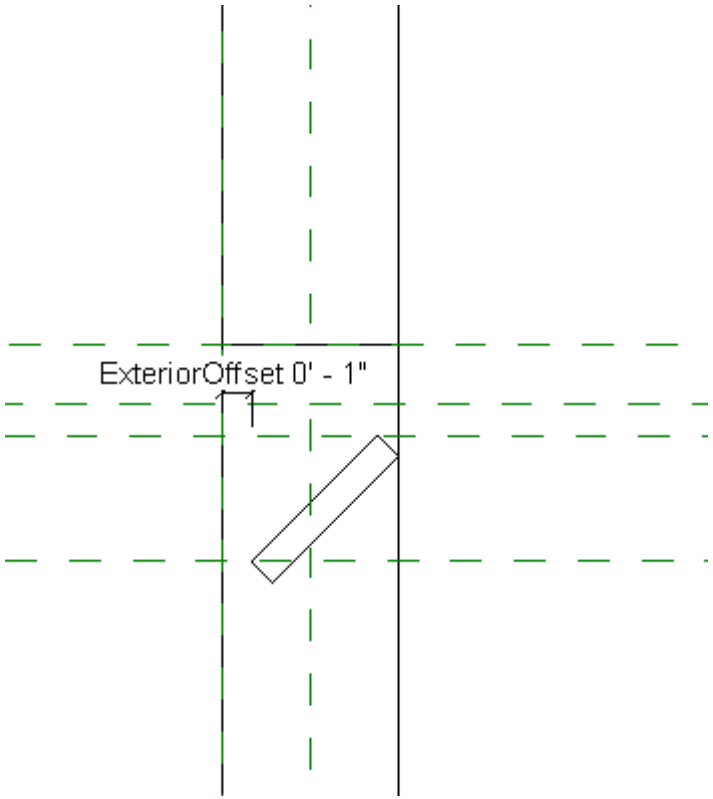
- Go to interior elevation to lock X axis





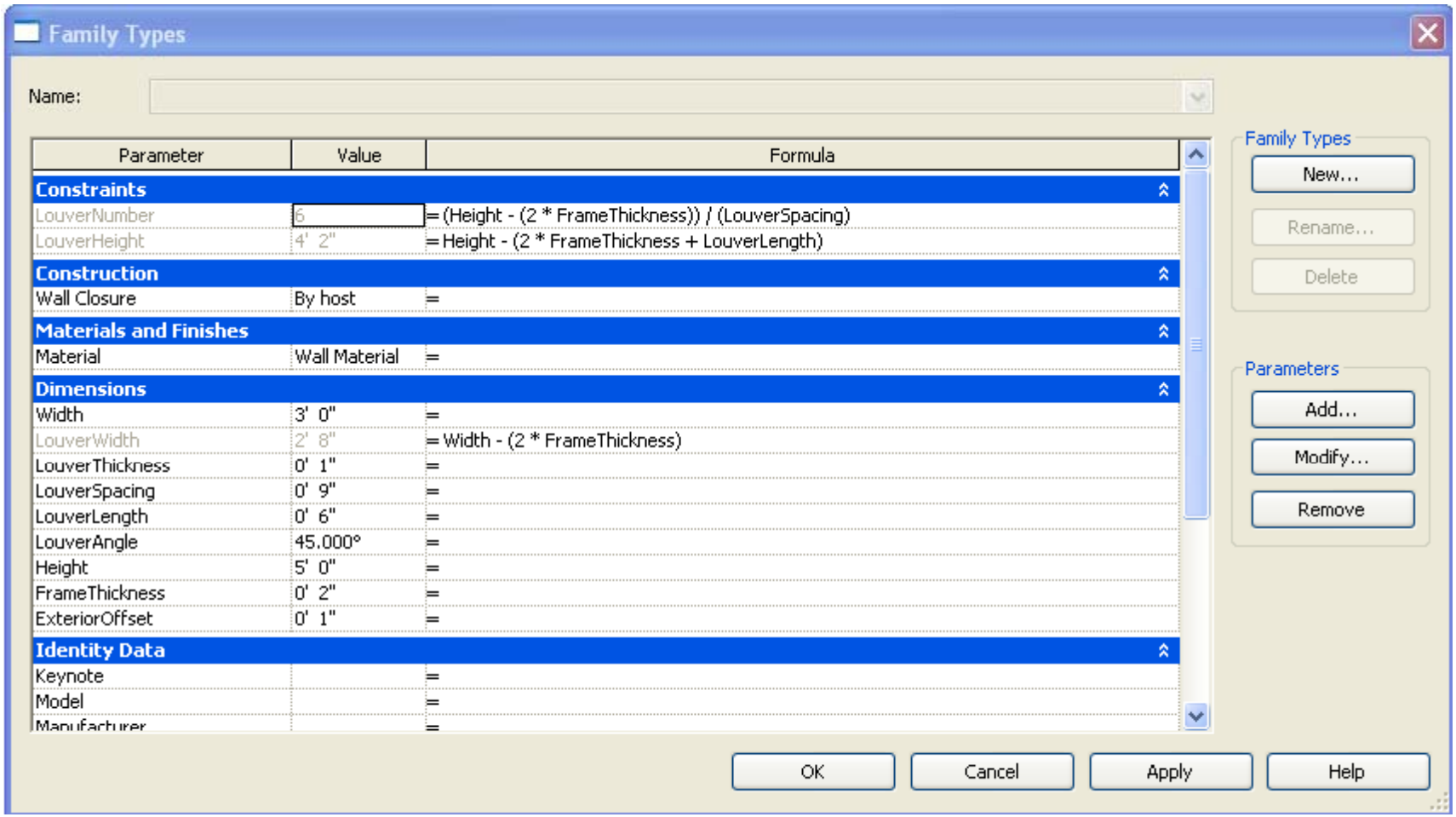
Families Nested –

- Go to left view and add dimension and parameter ExteriorOffset , this constrains the Y axis



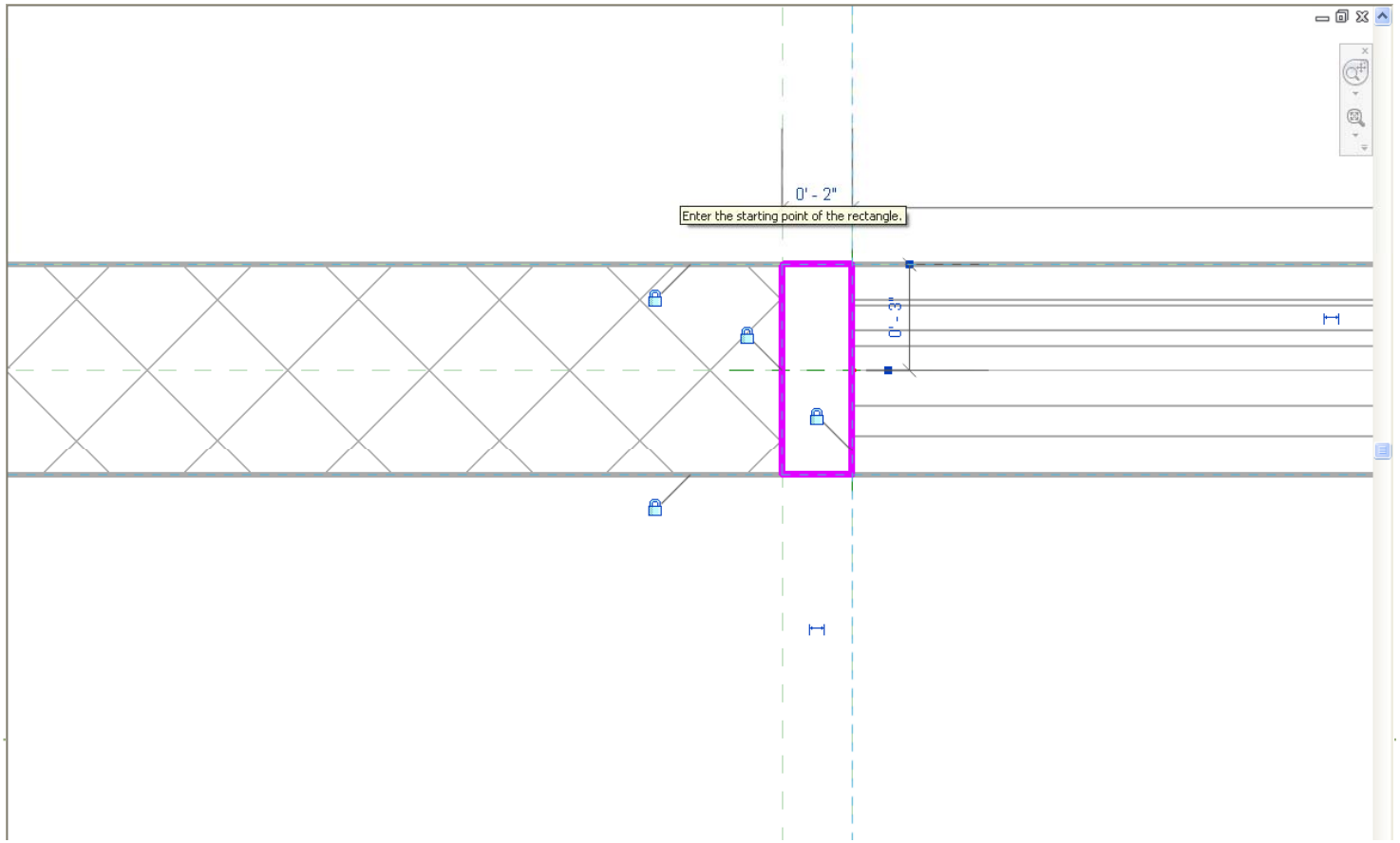
Families Nested –

- Create Number of Louvers parameter and also add Spacing parameter, add formula to control LouverNumber and LouverHeight



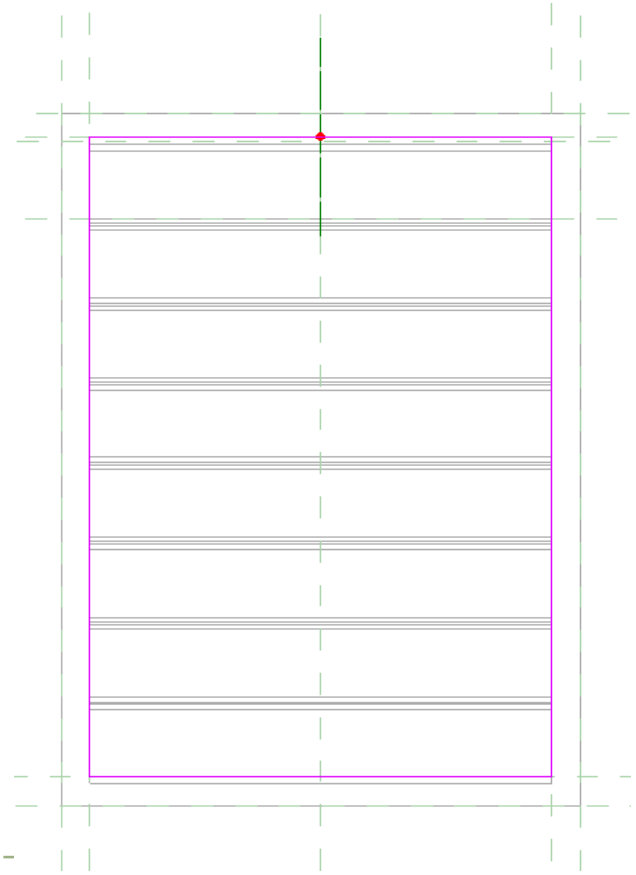
Families Nested –

- Relocate the sweep reference plane by dragging it to a vertical line
- Draw the profile and constrain them, finish the sweep



Families Nested –

- Create Solid Sweep for the frame and constrain it to all reference planes
- Relocate the sweep reference plane by dragging it to a vertical line



Families Nested –

- Change wall thickness to flex model and check