4 *Connections* Tutorial 4 – Design Collectors or Drag Strut (Canadian)

4.1 Software Version and Standard

This tutorial was completed using WoodWorks® Canada 2020, and CSA O86-19.

4.2 Introduction

This tutorial will demonstrate how the results from a WoodWorks® Shearwalls model can be interpreted to complete a connection design of a collector or drag strut. Good engineering judgement should be used when designing collectors or drag struts within shearlines. The forces used in this model come from the shearwalls model which is created by going through Shearwalls Tutorial 6.

Click here to download a copy of the Connections file (.des) created from going through this tutorial.

4.3 Drag Strut Force from Shearwalls Model

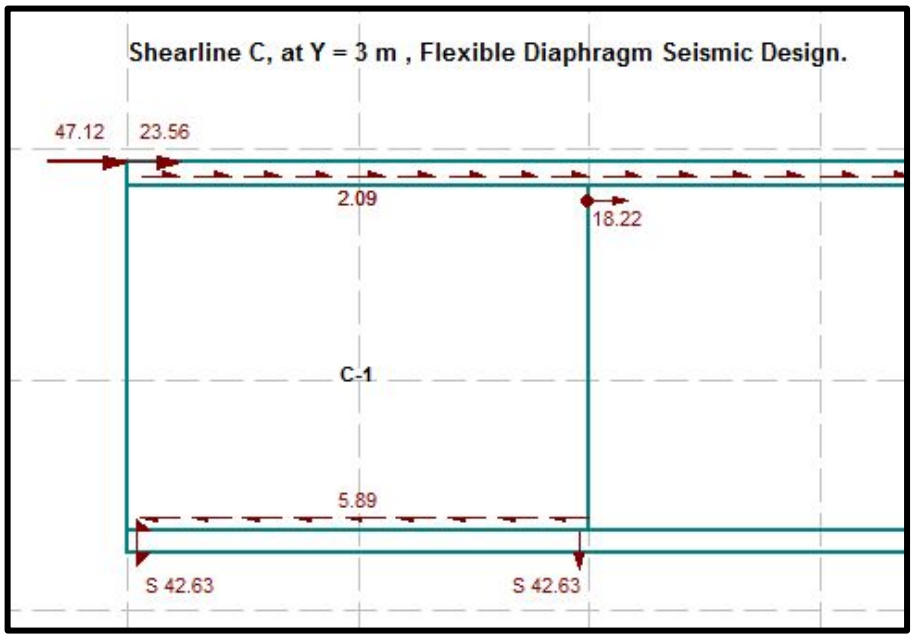

Figure 1: *Connections Tutorial 4 – Designing Collector along Shearline C Level 1*

Upon reviewing the forces in the elevation view, it can be observed that the worst-case loading scenario is when seismic loads are distributed by a Flexible diaphragm. The two portions of shearline C (C-1 and C-2) need to be connected by a collector that can resist an ***18.22 kN*** tension force. To resist the ***18.22 kN*** tension force, it will be necessary to specify a steel strap that can drag the 18.22 kN between the two shearline segments. Based on the model created in concept mode, it has been determined that the joists in the diaphragm above the shearwalls run parallel to the shearline. It will be necessary to create a continuous row of beams or blocking between segments C-1 and C-2 of the shearline. The steel strap will be nailed from the top plate of wall C-1 and be continuously nailed to blocking or beams on the underside of the diaphragm until it reached the top plate of Wall C-2. For more information on designing drag struts, please refer to Thor Matteson's Wood-Framed shear wall construction.

4.4 Steel to wood Lap Splice Connection Design

4.4.1 Connection Type

1. Click the ***New*** button on the toolbar.
2. Select the connection type ***Lapped Shear, wood-to-steel, Splice, one wood, one steel***.
3. Select ***Nails***.

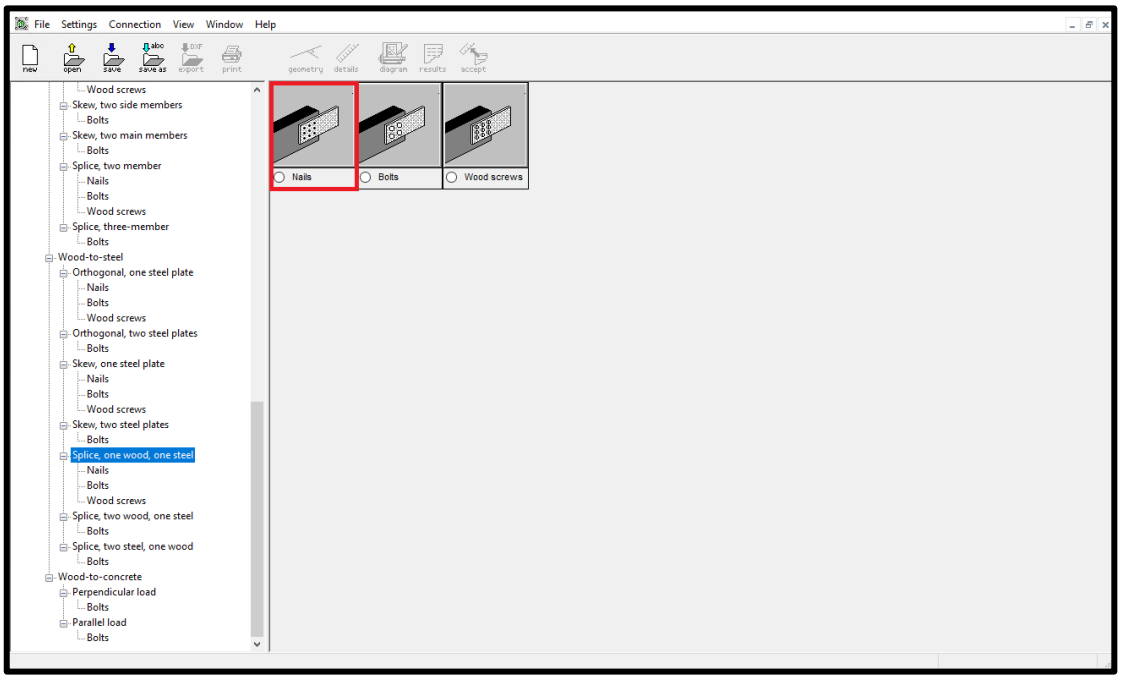

Figure 2: *Connections Tutorial 4 – Selecting Nail Splice Connection*

4.4.2 Main Member

1. Specify ***Material*** to ***Lumber joist***.
2. Specify ***Species*** as ***S-P-F***.
3. Specify ***Grade*** as ***No.1/No.2***.
4. Specify ***Thickness*** as ***38 (mm)***.
5. Specify ***Width*** as ***140 (mm)***.

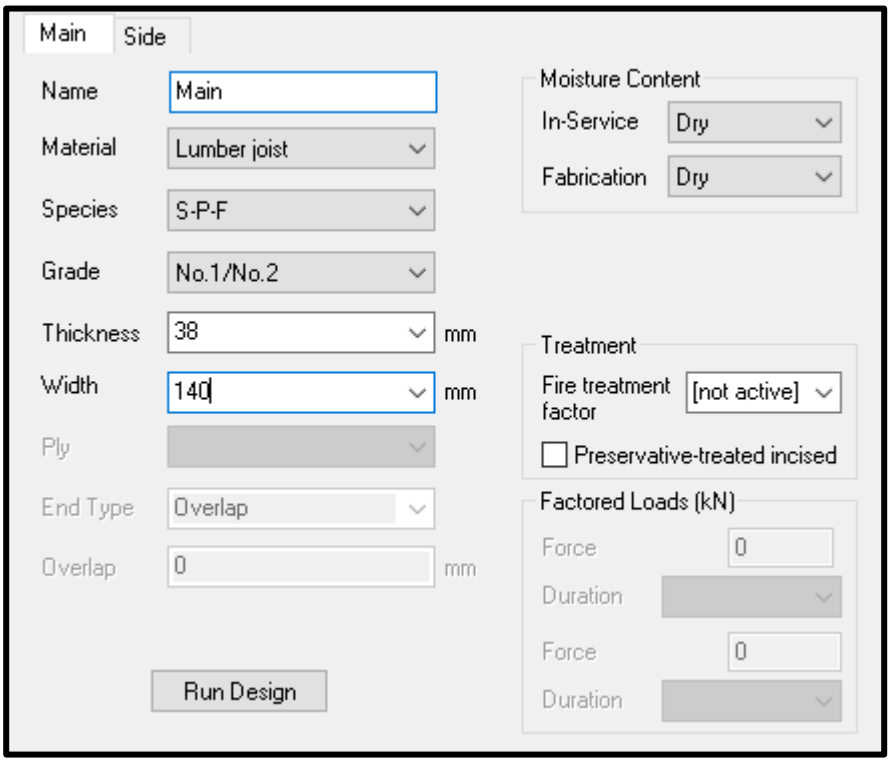

Figure 3: *Connections Tutorial 4 – Main Member Details*

4.4.3 Side Member

1. Specify ***Width*** as ***127 (mm)***.
2. Specify ***Thickness*** as ***1.519 (16 ga) (mm)***.
3. Specify ***End Type*** as ***Overlap***.
4. Specify a ***Force*** of ***18.22 (kN).***

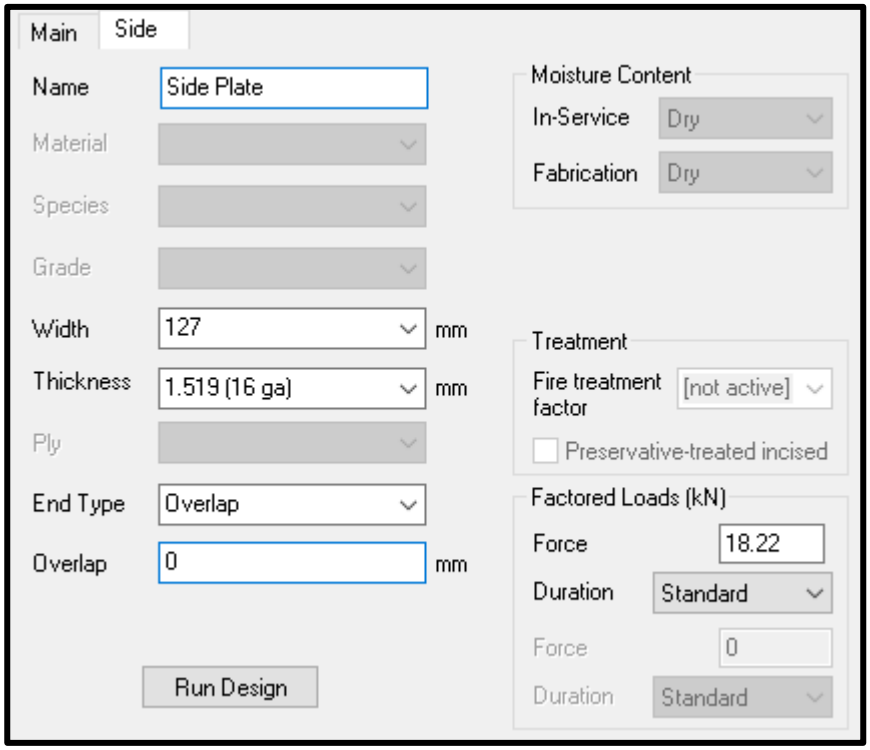

Figure 4: *Connections Tutorial 4 – Side Member Details*

4.4.4 Nail Details

1. Specify a ***Nail* T*ype*** as ***Common***.
2. Specify a ***Nail Length*** of ***44 mm (1-3/4")***.
3. Leave all other Parameters as (***unknown)***.
4. Click ***Run*** Design.

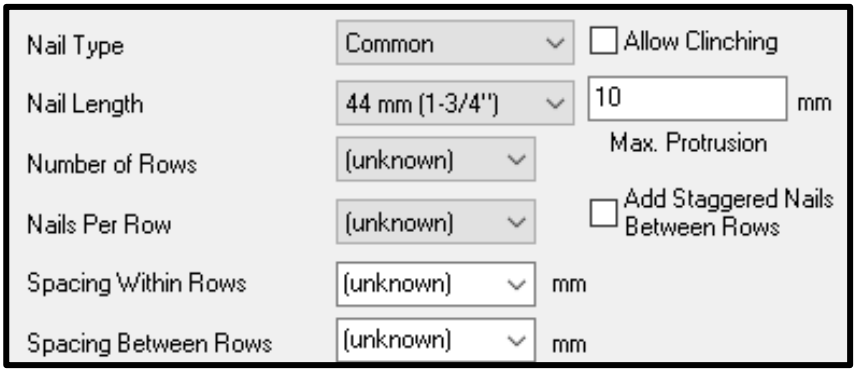

Figure 5: *Connections Tutorial 4 – Nail Details*

4.4.5 Review and Accept Design Results

Once a load has been input, *Connections* will automatically complete the design, and a drawing of the connection will automatically generate on the ***Details*** screen. At this point, it is possible to review the ***Diagram***, ***Results*** and ***Accept*** the design. Both the ***Diagram*** and ***Results*** can quickly be printed using the ***Print*** icon.

Click here to download a PDF of the design results.

Click here to download a PDF of the diagram.

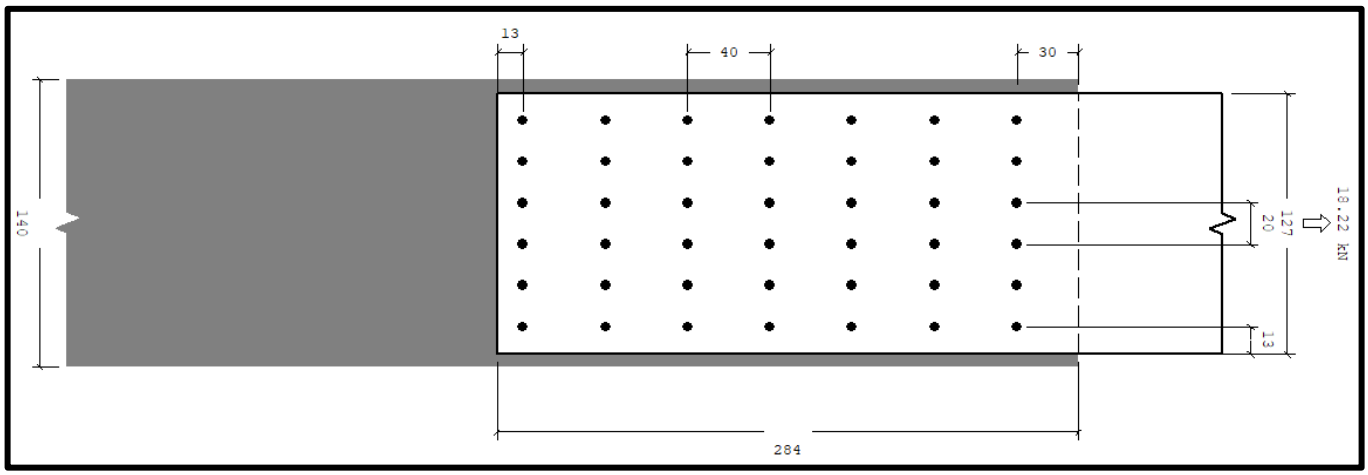

Figure 6: *Connections Tutorial 4 – Nail Splice Connection Detail*