

4 Connections Tutorial 4 – Design Collectors or Drag Strut (US)

4.1 Software Version and Standard

This tutorial was completed using WoodWorks® US 2019, and NDS 2018.

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 (.con) created from going through this tutorial.

4.3 Drag Strut Force from Shearwalls Model

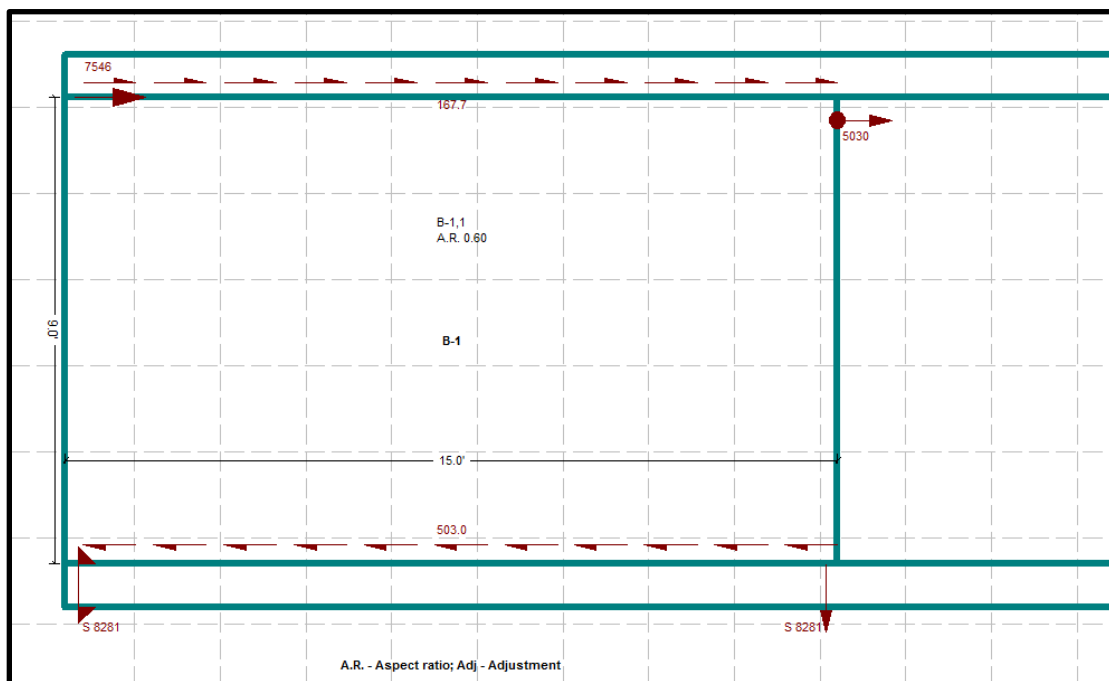


Figure 1: *Connections Tutorial 4 - Designing Collector along Shearline B Level 1*

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 B (B-1 and B-2) need to be connected by a collector that can resist a **5030 lbs** tension force. To resist the **5030 lbs** tension force, it will be necessary to specify a steel strap that can drag the **5030 lbs** 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 B-1 and B-2 of the shearline. The steel strap will be nailed from the top plate of wall B-1 and be continuously nailed to blocking or beams on the underside of the diaphragm until it reached the top plate of Wall B-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**.

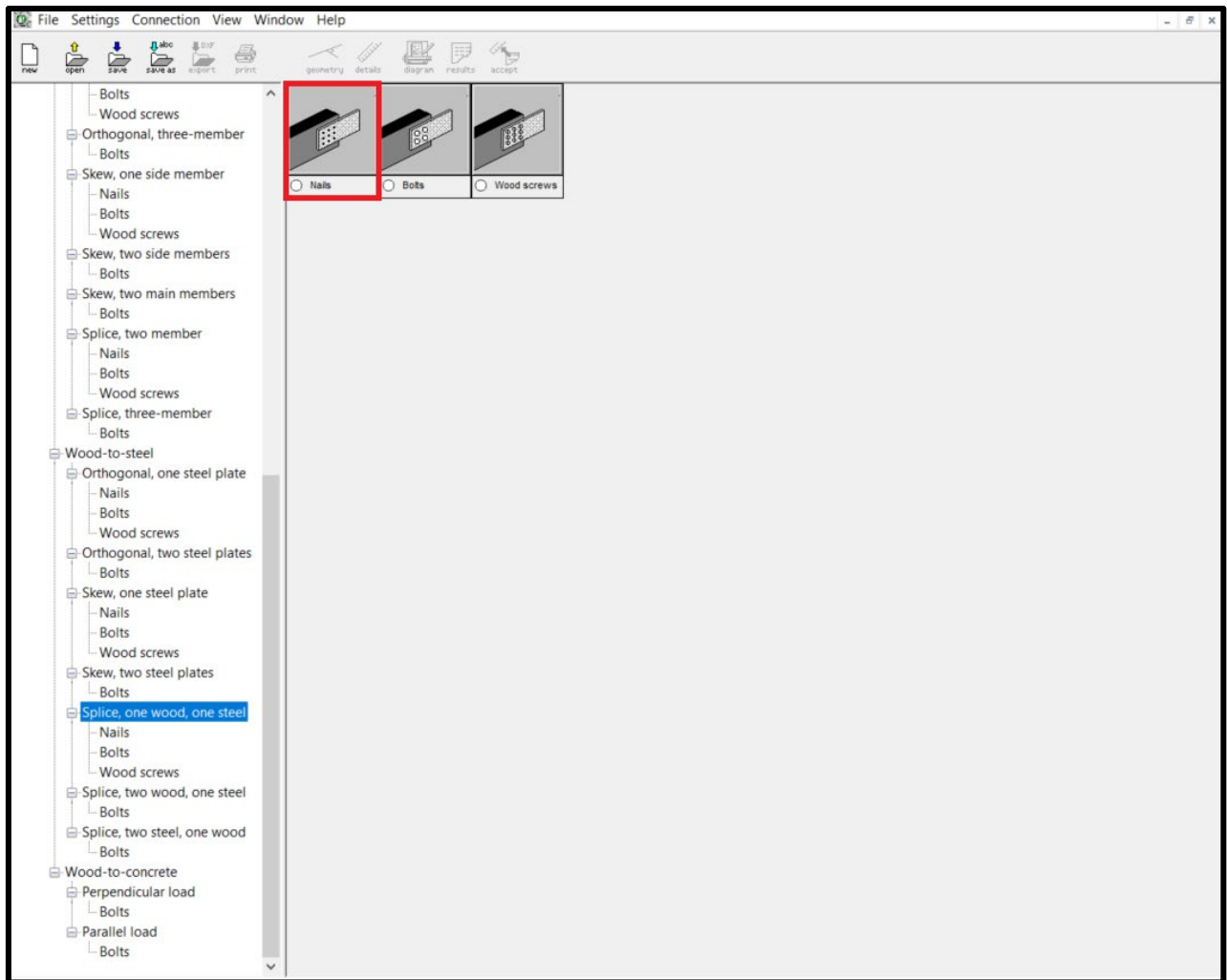


Figure 2: Connections Tutorial 4 – Selecting Nail Splice Connection

4.4.2 Main Member

1. Specify **Material** to **Lumber-soft**.
2. Specify **Species** as **D.Fir-L**.
3. Specify **Grade** as **No.2**.
4. Specify **Thickness** as **2 (in.)**.
5. Specify **Width** as **6 (in.)**.

The screenshot shows a software interface for configuring a 'Main Member'. It features two tabs: 'Main' and 'Side'. The 'Main' tab is active, displaying various configuration options. On the left side, there are input fields for 'Name' (Main), 'Material' (Lumber-soft), 'Species' (D.Fir-L), 'Grade' (No.2), 'Thickness' (2 in.), 'Width' (6 in.), 'Ply' (disabled), 'End Type' (Overlap), and 'Overlap' (0.0 in.). A 'Run Design' button is located at the bottom left. On the right side, there are sections for 'Moisture Content' (In-Service: Dry, Fabrication: Dry), 'Temperature (deg. F)' (T < 100F), 'Fire Retardant' (Fire treatment factor: [not active]), and 'Loads (lbs)' (Force: 0, Duration: disabled).

Figure 3: Connections Tutorial 4 – Main Member Details

4.4.3 Side Member

1. Specify **Width** as **5 (in.)**.
2. Specify **Thickness** as **0.1046 (12 ga) (in.)**.
3. Specify **End Type** as **Overlap**.
4. Specify a **Force** of **5030 (lbs)**.

The screenshot shows a software interface for configuring a Side Member. The 'Side' tab is selected. The main configuration area on the left includes the following fields:

- Name: Side Plate
- Material: (dropdown menu)
- Species: (dropdown menu)
- Grade: (dropdown menu)
- Width: 5 in.
- Thickness: 0.1046 (12 ga) in.
- Ply: (dropdown menu)
- End Type: Overlap
- Overlap: 0.0 in.

On the right side, there are additional settings:

- Moisture Content: In-Service (Dry), Fabrication (Dry)
- Temperature (deg. F): T < 100F
- Fire Retardant: Fire treatment factor ([not active])
- Loads (lbs): Force (5030), Duration (Ten Years)

A 'Run Design' button is located at the bottom center of the interface.

Figure 4: Connections Tutorial 4 – Side Member Details

4.4.4 Nail Details

1. Specify a **Nail Type** as **Common**.
2. Leave all other Parameters as **(unknown)**.
3. Click **Run** Design.

Nail Type	Common wire nail	<input type="checkbox"/> Preboring
Nail Length	(unknown)	0.401 in
Number of Rows	(unknown)	Max. Protrusion
Nails Per Row	(unknown)	<input type="checkbox"/> Add Staggered Nails Between Rows
Spacing Within Rows	(unknown)	in
Spacing Between Rows	(unknown)	in

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.

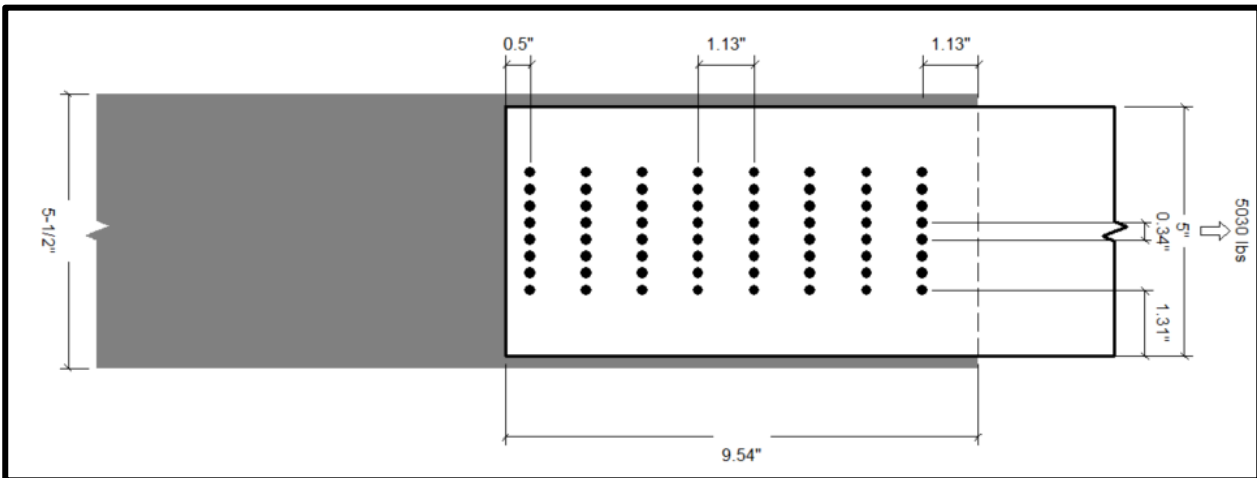


Figure 6: *Connections Tutorial 4 – Nail Splice Connection Detail*