

# Setup & User Guide

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## DuraFuse Frames<sup>®</sup> Revit Family

*Revit 2020 or Newer*

Version 2.1



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## 1 Overview

The DuraFuse Frames<sup>®</sup> connections can now be modeled in Revit using a family. The family is imported into Revit and applied at beam and column joints. In addition, with pre-determined markers, the family can be assigned automatically, making the modeling process fast and easy. These instructions will help the user download, setup, and apply DuraFuse Frames connections in a Revit model. Prior to setup, be sure that Revit 2020 or newer is installed. If Revit 2020 or newer has not been installed, please contact your Autodesk representative.

## 2 Project Specific Information

Before the DuraFuse Frames family can be applied in the model, project specific information will need to be obtained from DuraFuse Frames. Use one of the following resources:

- The DuraFuse Frames engineer on the project you are working with
- General Phone: 801-727-4060
- General Email: [contact@durafuseframes.com](mailto:contact@durafuseframes.com)

The items below will be included in the project-specific information. All files must be saved to the same folder.


- Frame Elevations with connection ID's
- DuraFuse Connection.txt  DuraFuse Connection.txt

Figure 2-1 is an example of a frame elevation, which indicates where the connection ID's apply. Use this to locate and later check applied connection ID's in the model. See Section 4 for more information on checking ID's after they have been applied in the model.

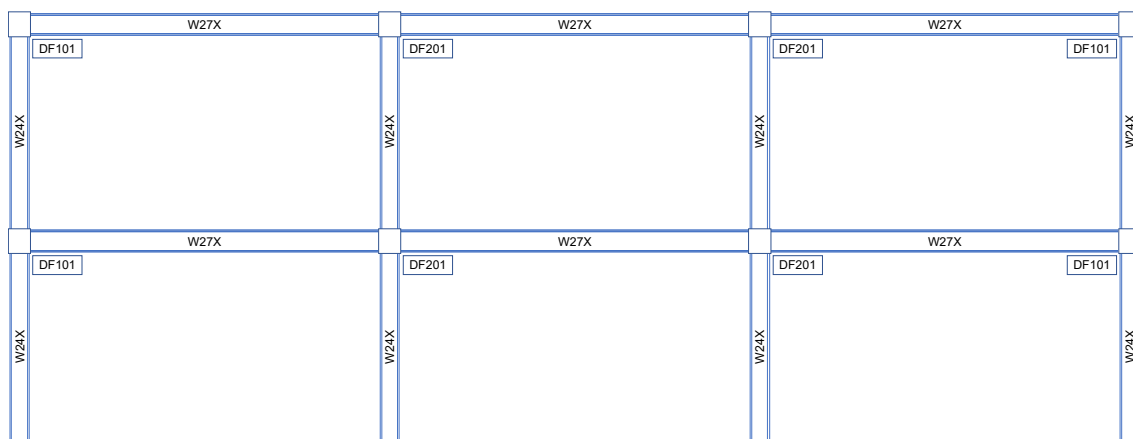


Figure 2-1. DuraFuse Frames Elevation Example

The **DuraFuse Connection.txt** file is a project specific file that contains all connection information for each ID from the DuraFuse Frames drawings. The Revit family will **ONLY** recognize the text file by the same name as the *DuraFuse Connection.rfa* file. **Please verify or re-name the .txt file to DuraFuse Connection.txt.** Data within the text file is organized by unique connection ID's, (see example in Figure 2-2).



```
,TimeStamp##OTHER##,Two Sided##OTHER##,Shear Plate##OTHER##,Bridge Plate##OTHER##,COL Size##
,B3_a##LENGTH##INCHES,BM_tw_a##LENGTH##INCHES,BM_t_a##LENGTH##INCHES,BM_d_a##LENGTH##INCHES.
One Sided,200505 13_47_41,0,0,0,W18X130,0.5,0.75,1.,4.75,3.,0.875,2.625,1.125,1.1875,0.,DF
One Sided - Bridge Plate,200505 13_47_41,0,1,1,W18X130,0.5,0.75,3.,4.75,3.,0.875,2.625,1.12
Two Sided,200505 13_47_41,1,0,0,W18X130,0.75,1.,1.4375,4.,3.,0.875,2.625,1.125,1.1875,0.,DF
Two Sided - Bridge Plate,200505 13_47_41,1,1,1,W18X130,0.625,0.75,3.,4.75,3.,0.875,2.625,1.125,1.1875,0.,DF
```

Figure 2-2. Text File Sample Data

## 3 Setup

The DuraFuse Frames Revit family is not an executable file requiring actual installation. Instead, it is a “family” plugin that must be loaded into Revit. There is no actual installation but there are several steps required for setup prior to applying DuraFuse Frames connection in the Revit model. These steps are outlined in the following sections.






### 3.1 OBTAIN THE DURAFUSE FRAMES REVIT FAMILY FILES

Obtain the DuraFuse Frames SDS2 Revit Family Package from one of 3 sources:

1. Download the package from [durafuseframes.com/resources/](http://durafuseframes.com/resources/) and scroll down to Downloads.
  - a. After logging in, locate the Revit Family and select “Download”.
  - b. Register and log in to receive updates.
  - c. Go to the Resources page.
  - d. Locate the Revit Family and select “Download”.
  - e. Save the package to a known location.
2. Contact DuraFuse Frames directly to receive the package.  
 Phone: 801-727-4060  
 Email: [contact@durafuseframes.com](mailto:contact@durafuseframes.com)

The user can also see that there is a DuraFuse Frames Family available through the AutoDesk App Store ([apps.autodesk.com](http://apps.autodesk.com)), but only the instruction document is available for download there, which will redirect the user to [DuraFuseFrames.com](http://DuraFuseFrames.com) for download of the actual package.

The DuraFuse Frames Revit Family Package will include the items listed below. The included files and their use will be explained in following sections. Save these files to the same location as the .txt file in Section 2.

- DuraFuse Connection.rfa  DuraFuse Connection.rfa
- DuraFuse Connection Tag.rfa  DuraFuse Connection Tag.rfa
- Unmapped\_Cnxn.rfa  Unmapped\_Cnxn.rfa
- DuraFuseFrames\_CnxnMap\_vX.X.dyn  DuraFuseFrames\_CnxnMap\_v1.9.dyn
- DuraFuse Connection.txt  DuraFuse Connection.txt

### 3.2 REPLACE THE TEXT FILE

The DuraFuse Connection.txt file is a general file for a standard one and two-sided DuraFuse connection configuration. It is not project specific. Replace this file with the project specific text file obtained in Section 2.

### 3.3 LOAD THE DURAFUSE FRAMES FAMILY

Load the DuraFuse Connection.rfa file into the Revit model by selecting the **Insert** tab and **Load Family** from the ribbon (see Figure 3-1), or, type **LF**, the load family keyboard shortcut. Select the DuraFuse Connection.rfa file. A separate window will appear asking to load a **Specify Types**. Select all the connection ID's that appear in the list by holding down the **shift** key (see Figure 3-2). Then select **OK**. When this step is complete, the Tag file (project specific text file, see Section 2) will automatically be loaded into Revit as long as it is saved in the same folder as the DuraFuse Connection.rfa file.

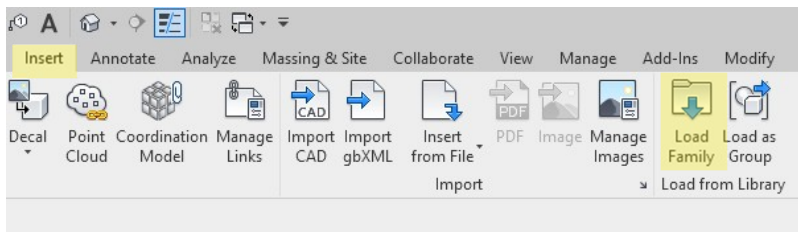


Figure 3-1. Load the DuraFuse Frames Family into Revit

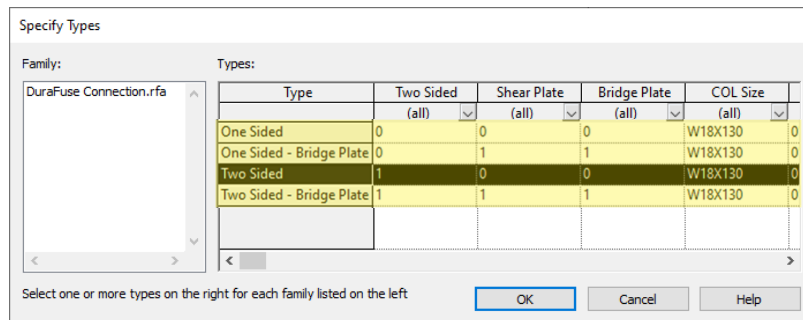


Figure 3-2. Load All Connection ID Types

### 3.4 LOAD CONNECTION MAPPING TOOL

Similar to the previous section, load the Unmapped\_Cnxn.rfa file into the Revit model by selecting the **Insert** tab and **Load Family** from the ribbon (see Figure 3-1), or, type **LF**, the load family keyboard shortcut. Select the Unmapped\_Cnxn.rfa file. This family displays a red sphere that later indicates which connections had an error and were unmapped (see Section 4).

### 3.5 ASSIGN COLUMNS & BEAMS WITH DURAFUSE FRAMES TAG

A special tag is assigned to beams and columns in order for the Dynamo import tool to identify which joints to apply DuraFuse Frames connections. This tag is indicated by **DF**. In Revit, select all the DuraFuse Frames beams and columns. Then, in the Properties menu, scroll down to the **Identity Data** section. Next to **Comments**, type **DF**. This will identify the members as DuraFuse Frames members.

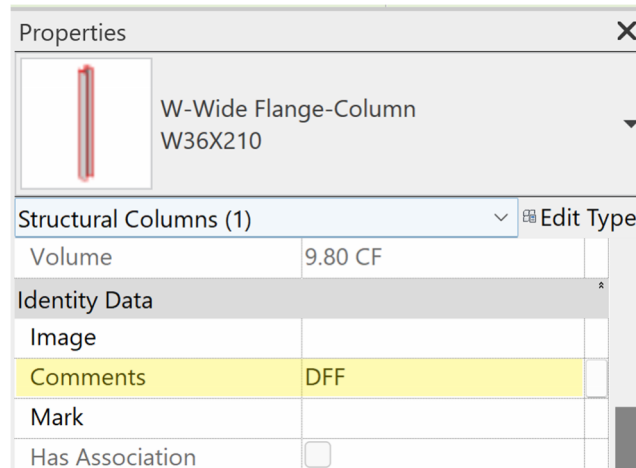


Figure 3-3. Add DFF Tag to all DuraFuse Frames Members

### 3.6 ASSIGN BEAM ENDS WITH MOMENT FRAME CONNECTIONS

In addition to adding the tags to all members, all DuraFuse Frames beam ends with a connection need the moment frame tag. First, select all DuraFuse Frames beams in the model. Then, in the Properties menu, under **Structural**, find the **Start** and **End Connection** entries. If both ends are a DuraFuse Frames connection, then select **Moment Frame** for both ends. If only one end applies, then select **Moment Frame** and **None** for the appropriate ends.

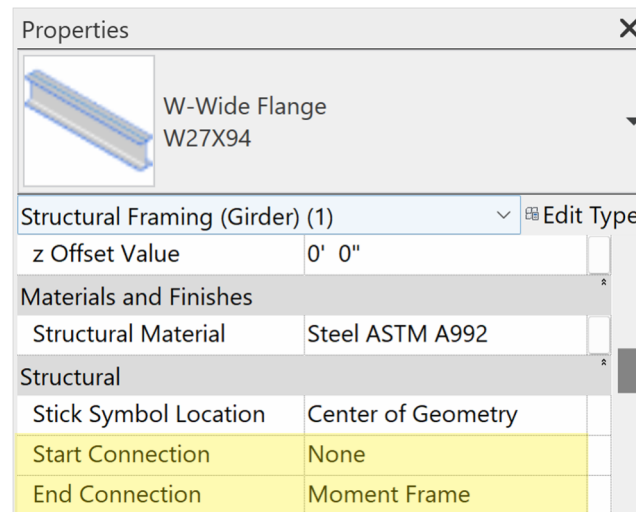


Figure 3-4. Beam Moment Frame Assignment

Depending on which view you are working in, it may be difficult to tell which end of the beam is the “Start” and which is the “End”. To better view this, change to a plan view at the elevation of the beam in question. Structural plans can be found in the **Project Browser** under **Structural** and **Structural Plans** (see Figure 3-5). Double click on the applicable plan view. Then, in the Properties menu, under **Identity Data**, change the **View Template** to “None” by selecting the current option and changing it in the dialog that pops up (see Figure 3-6). Lastly, on the bottom left of the screen, set the **Detail Level** to “Course” (see Figure 3-7). Now, the beams with moment frame connections will show up with a triangle. For

example, in Figure 3-8, the moment frame end is shown at the very right end of the beam. The other end does not have a moment frame connection assigned.

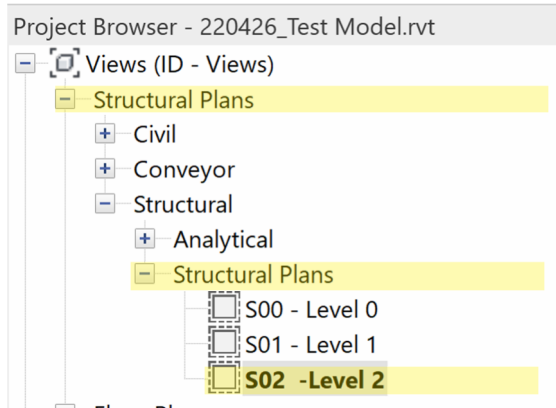


Figure 3-5. Structural Plan Views

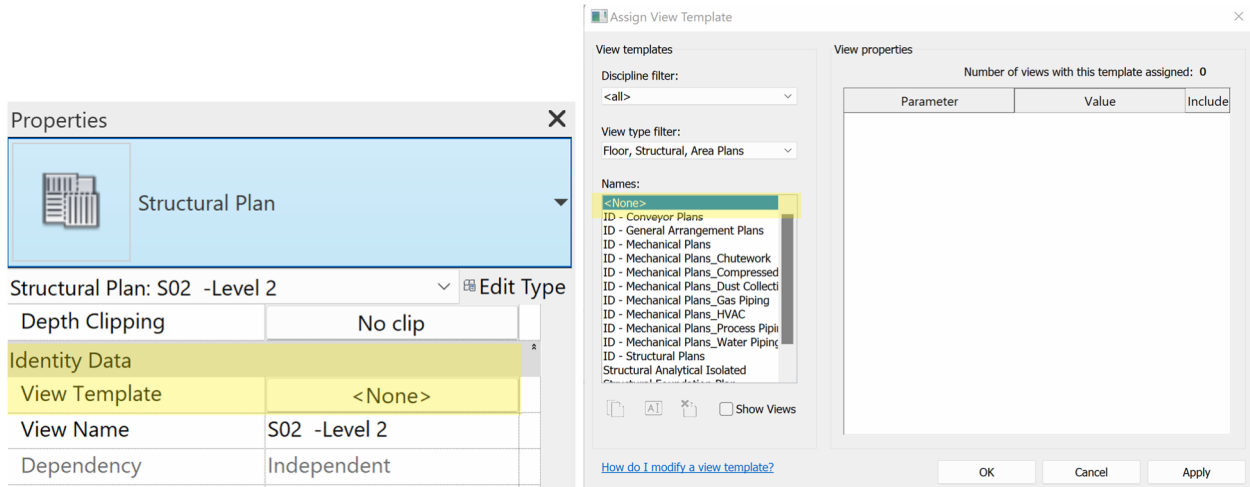


Figure 3-6. View Template Set to None

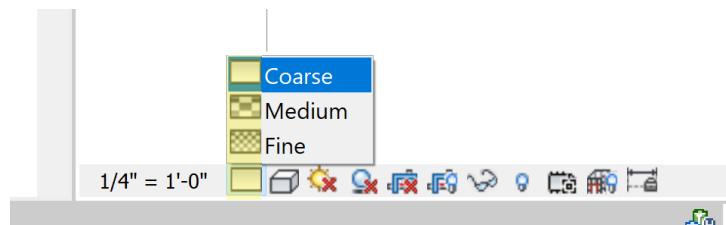


Figure 3-7. Detail Level Set to Coarse



Figure 3-8. Moment Frame Connection Indicator

## 4 Connection Mapping Tool

To make the process of assigning connections faster in a Revit model, a connection mapping tool can be used. The connection mapping tool, `DuraFuseFrames_CnxnMap.dyn` file provided in Section 2, automatically locates DuraFuse Frames members and assigns the appropriate connection and ID to joints.

Once all required files have been appropriately loaded in Sections 3.2-**Error! Reference source not found.**, and beams and columns have the appropriate assignments made (see Sections 3.5 and 3.6), follow the steps below to automatically apply DuraFuse Frames connections in the model.

1. In Revit, select **Manage** in the ribbon and then **Dynamo Player**.

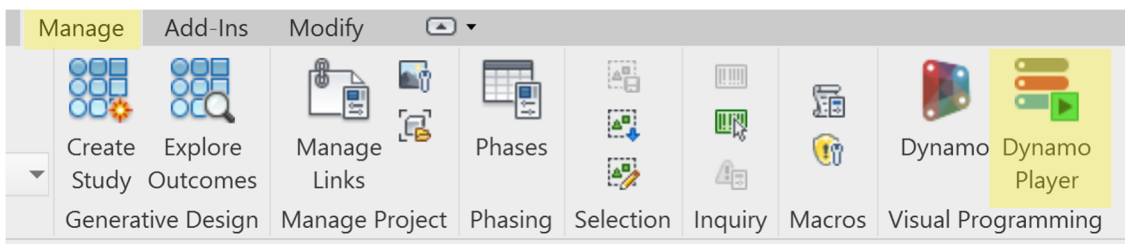




Figure 4-1. Manage Ribbon to Access Dynamo

2. Click the button with a folder and plus sign  next to the **Choose Folder** drop-down. You will be redirected to the **Manage Folders** window where you will click the **plus sign**  and navigate to the folder where the Revit family files are saved. Click **Select Folder** and close the Manage Folders screen in the Dynamo Player. Dynamo will automatically read in the **DuraFuseFrames\_CnxnMap.dyn** file that is in that folder.

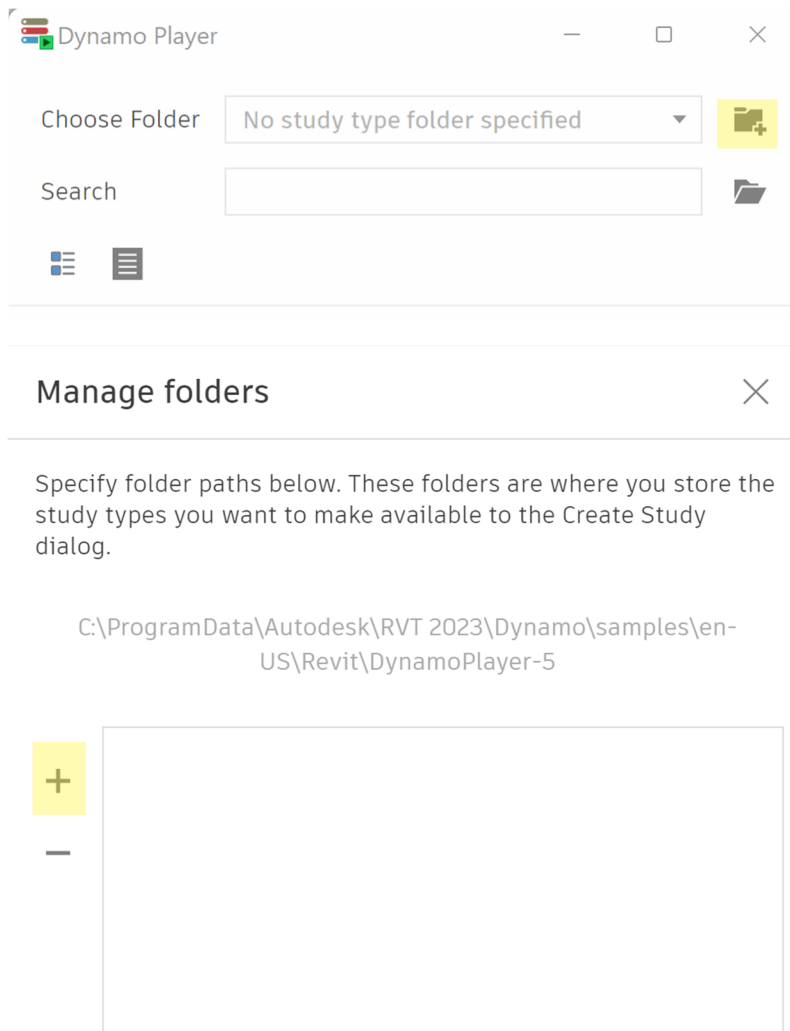


Figure 4-2. Navigate to the Connection Mapping Tool

3. Once the connection mapping tool has been read in, Dynamo Player will display the tool in the window (see Figure 4-3). Click on the **DuraFuse Frames logo**, next to the DuraFuseFrames\_CnxnMap.dyn file.

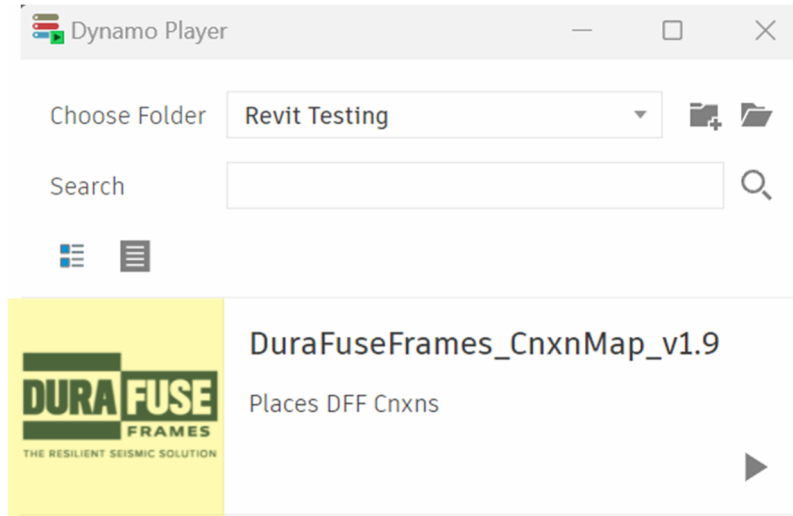


Figure 4-3. DuraFuse Frames Connection Map Tool

4. After being redirected to another window, under **Inputs**, select **Browse** and navigate to the folder with the project specific text file (**DuraFuse Connection.txt**), select it and select **Open**. The window will display the text file path and “Ready to Run” at the bottom.

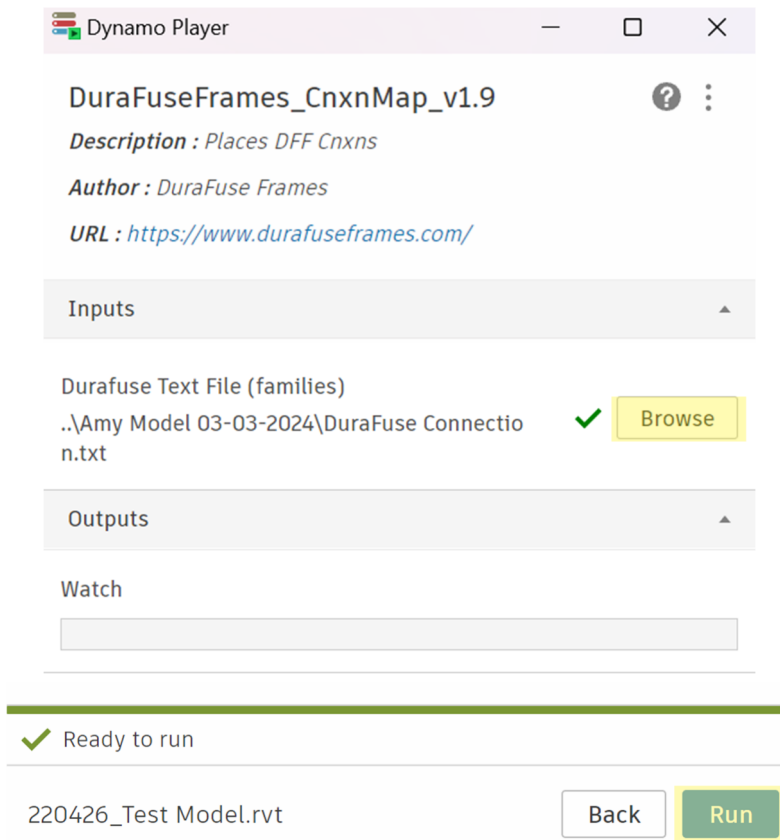


Figure 4-4. Load the Project-Specific Text File



5. At the bottom of the screen, select the **Run** button. Dynamo will indicate it is “Running”.
6. Once the dynamo player completes, a message box will appear in Revit, indicating how many connections were mapped correctly and how many were not mapped (see Figure 4-5). The un-mapped connections will also display in the model with a red sphere (see Figure 4-6). Un-mapped connections are those that have modelling errors. These errors can include the following:
  - Members marked as “DFF” and moment frame ends but beam and column sizes do not match any of the ID’s in the text file.
  - A beam is marked as “DFF” and end is marked as a moment frame but the column does not have DFF assigned.

Review all locations that should have DuraFuse Frames connections to be sure the connections have been applied appropriately. If some locations are not correct, check the beam and columns sizes in the model that they match the frame elevations and connection ID’s. Also check the “DFF” assignment to the members, and the moment frame connection at each end of the beam. Make any necessary corrections.

7. If any corrections were made to the un-mapped connections, re-run the Dynamo Player and check the un-mapped locations again.

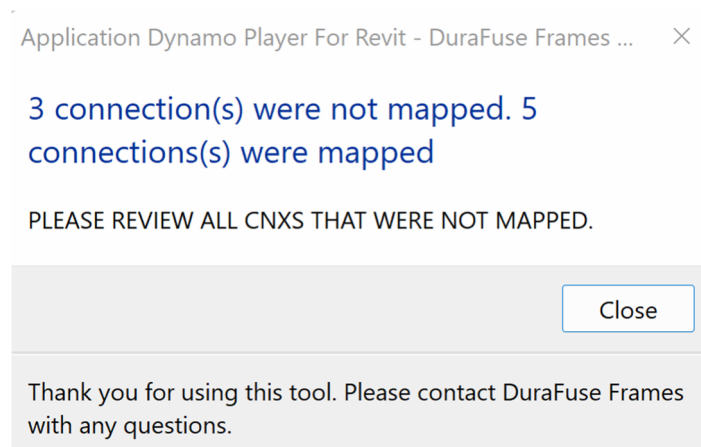


Figure 4-5. Mapped Connection Notification

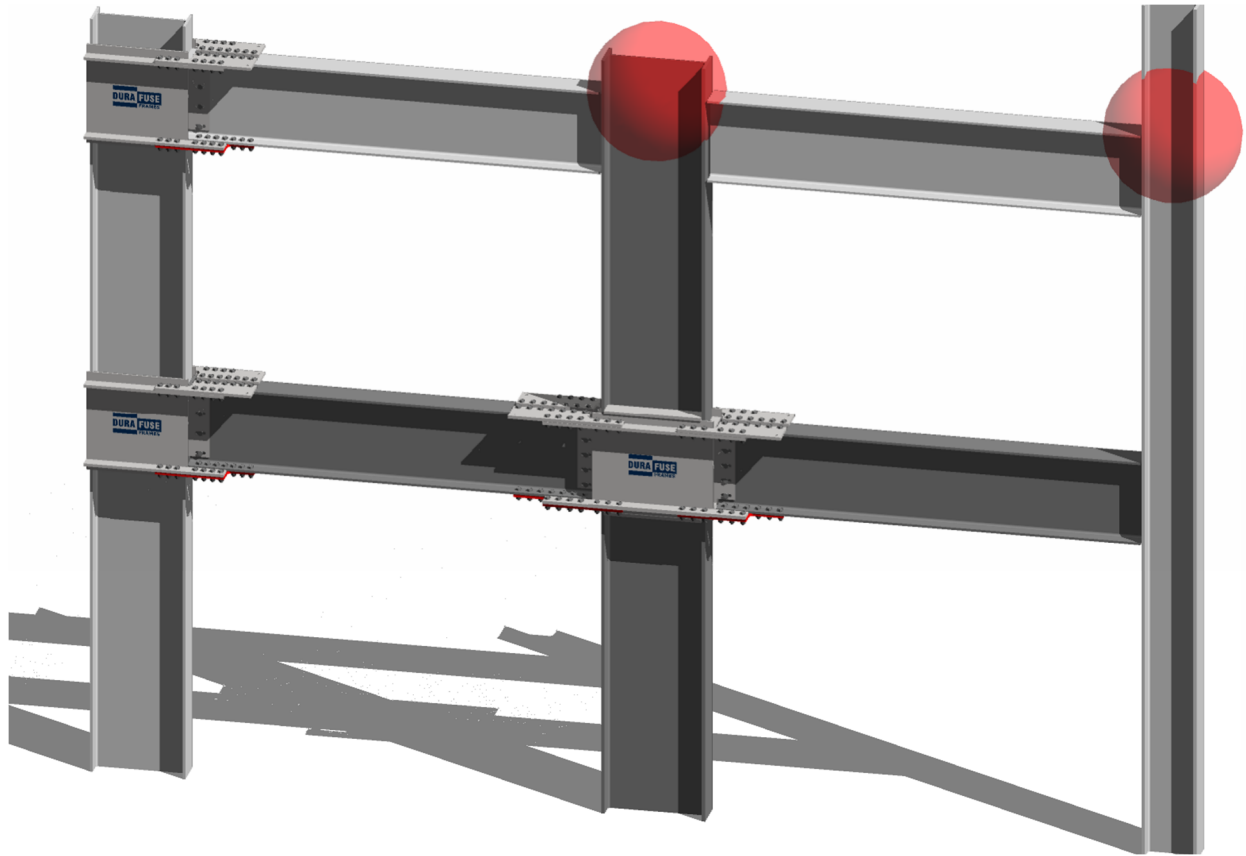


Figure 4-6. Un-mapped Connections Indicated by Red Sphere

8. If unmapped connections shown with the red sphere, are not actually red, some of the visual settings may not be correct. The family may also not appear as it does in Figure 4-6. To fix this, remove the applied template by navigating to the Properties menu, to the **Identity Data** section and under **View Template**, select **None** (see Figure 4-7). This will remove any template settings, which will display the sphere and the family appropriately.

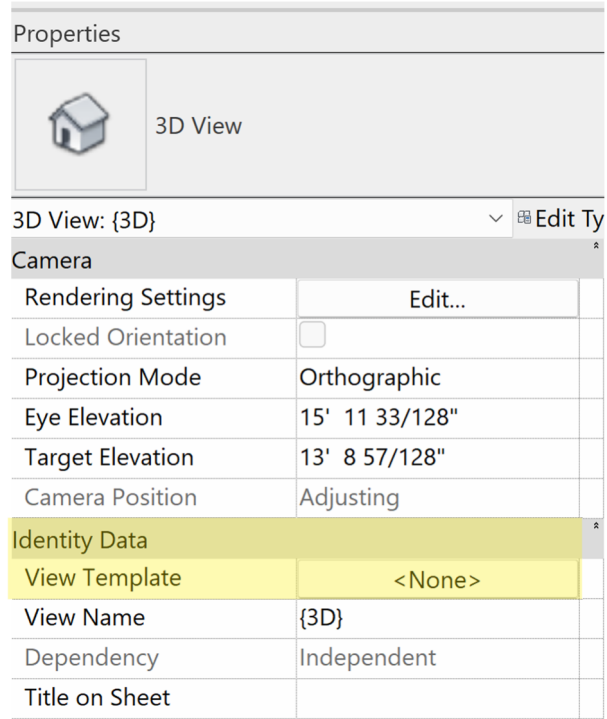


Figure 4-7. Remove Applied Template

- Then, set the shading level by clicking the icon in the lower left-hand corner and set it to **Shaded** (see Figure 4-8). The sphere should show up red.

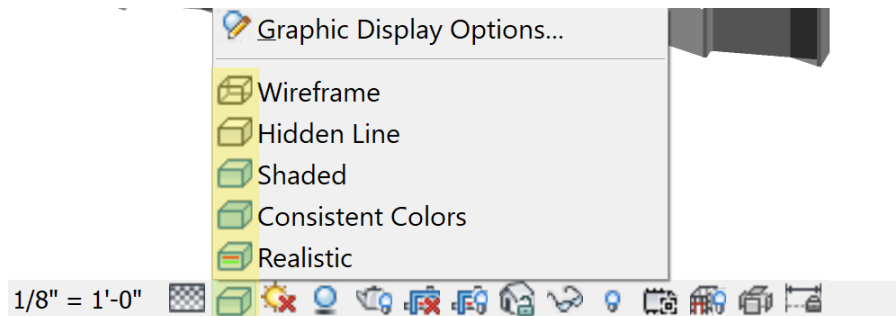


Figure 4-8. Shading Level

## 5 The DuraFuse Frames Revit Family

The DuraFuse Frames Revit Family is the tool that reads connection ID information and applies the connection to the designated beam/column joint. The family reads all connection ID specific information from the project specific text file. This data proportions plates, welds, bolts appropriately for the beam/column combination. Once the correct data has been read from the text file, the connection is applied in the model.

The following sections provide instruction on changing settings or updating information for the DuraFuse Frames Revit Family.

## 5.1 VISUAL SETTINGS

For best visual graphics, select the **Edit** button next to **Visibility/Graphics Overrides** under the **Graphics** heading in the Properties menu. Or, type **VG**. Proceed to the **Model Categories** tab. Verify that all DuraFuse Frames options are checked under **Structural Connections**. DuraFuse Frames families contain their own visibility settings so that components can be turned on and off for visual effects.

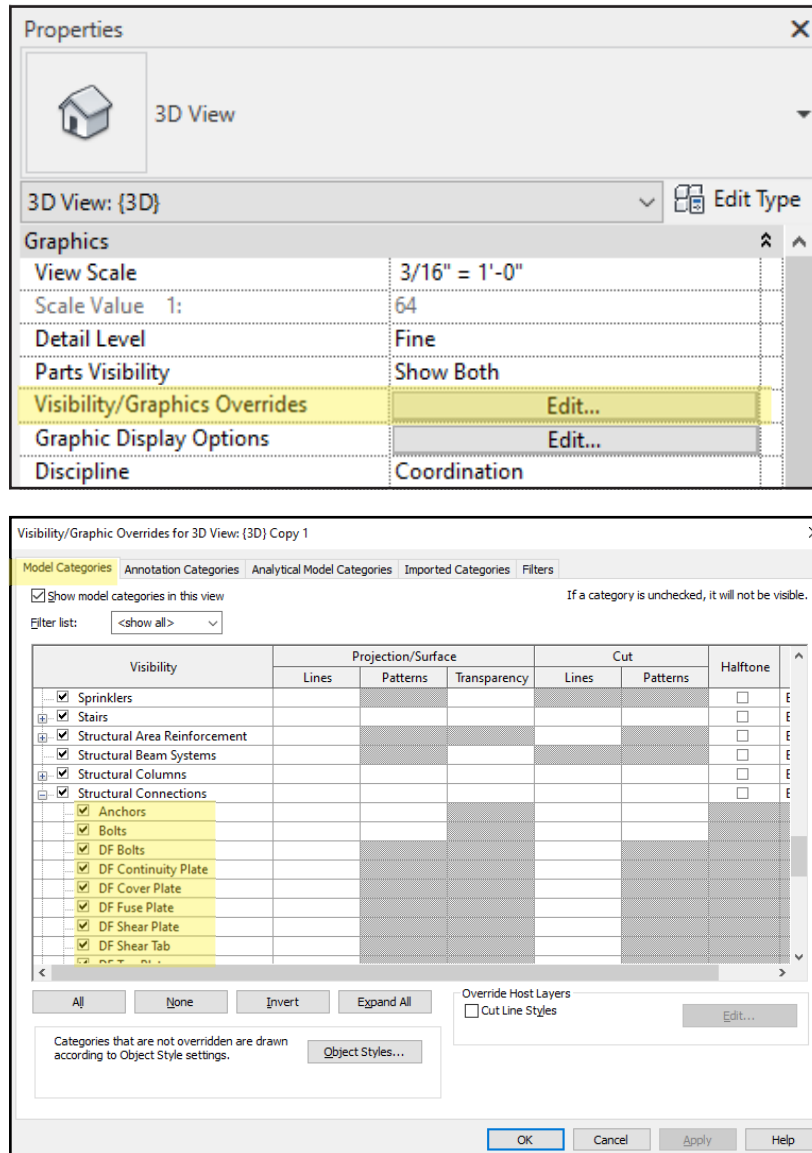


Figure 5-1. Visibility Settings

Also, set the detail level by clicking the icon in the lower left-hand corner and set it to **Fine** or **Medium** (see Figure 5-2).

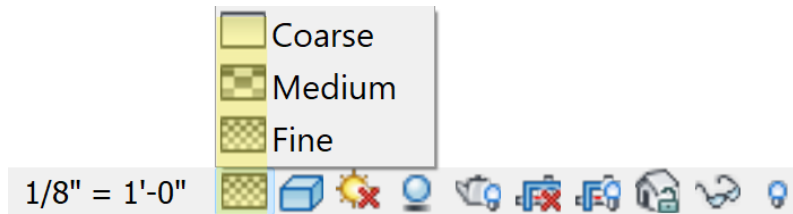


Figure 5-2. Detail Level

A DuraFuse logo tag is included in rendering tools for constructing drawings. If after placing the family, the DuraFuse Frames logo is mirrored, check or uncheck the **Right Hand** check box under the **Graphics** tab in the Properties menu. The family must be selected for these properties to appear.

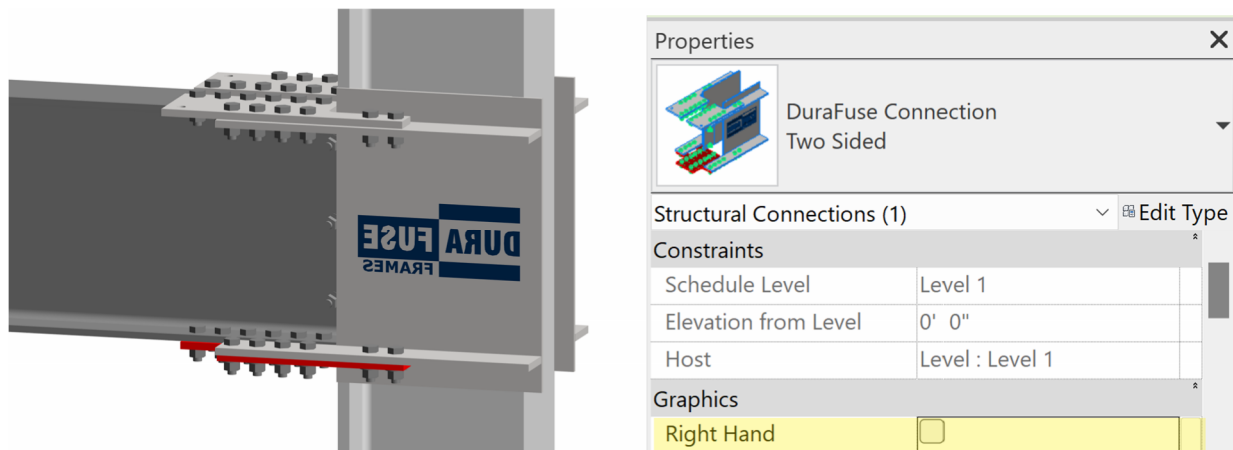


Figure 5-3. Mirrored Logo

## 5.2 UPDATE PROJECT SPECIFIC TEXT FILE

Occasionally, the project specific text file needs to be updated. This occurs when updates are made to the design and the connection designs change. When this happens, the text file can easily be updated without having to delete and replace any of the families in the model.

To update the text file, repeat the steps in Sections 3.2 and 4. A prompt for overwriting the current text file will appear. Select **Overwrite the existing version and its parameter values**.

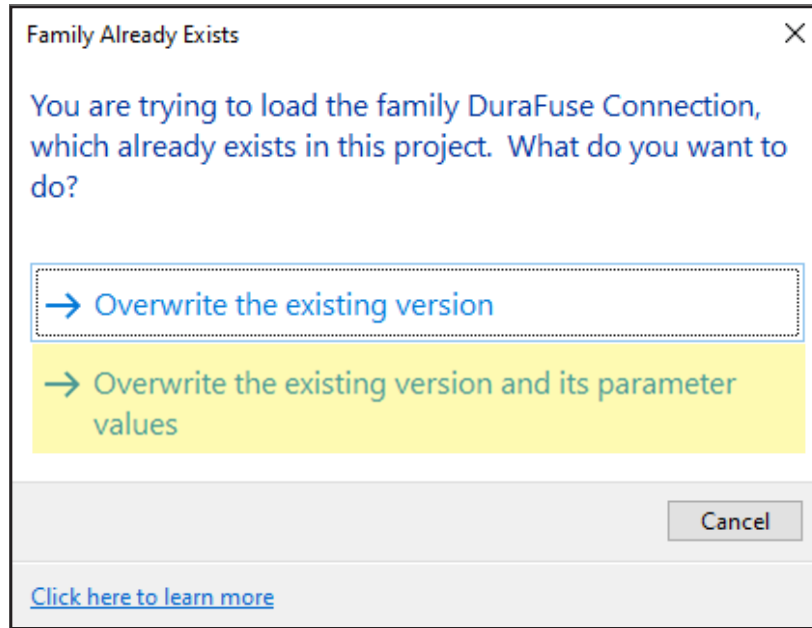


Figure 5-4. Overwrite Existing Text File

As long as the families placed in the model still correlate with the same connection ID from the new text file, the appropriate connection information will apply and be updated. If the ID's have changed at specific locations, the user can update the ID's by selecting an existing connection in the model. Then, in the Properties menu, select the connection and choose the ID from the available list in the drop-down menu (see Figure 5-5). The elevation views, provided by DuraFuse Frames will help locate the connection ID's and determine whether any of them have changed.

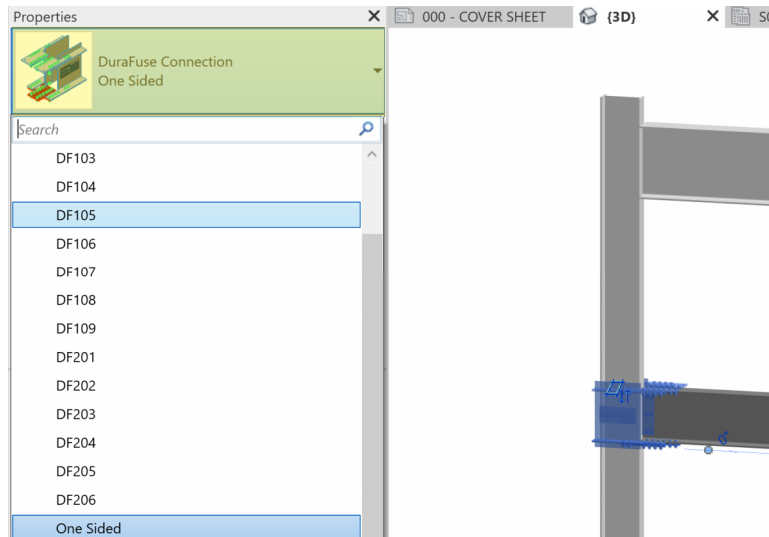


Figure 5-5. Update Connection ID

### 5.3 FAMILY SPECIFICS

In the Properties menu, under **Text**, there is information about the column and beam sizes that correlate with the placed family. These sizes should match the sizes in the model. If they do not match, either the model sizes are incorrect, or the placed family ID is incorrect. This information helps the user make quick updates to ID's or member sizes.

Beam A is located to the left of the connection and Beam B is to the right when the beam is oriented North in plan view.

The appearance for rendering and other graphic visuals of the family materials can be adjusted. Select a connection in the model. In the Properties menu, under **Edit Type**, select **Materials and Finishes**. Several options are included here based on user preference.

The DuraFuse logo tag can be turned on or off, as needed, by selecting the check box next to **Show Logo**.

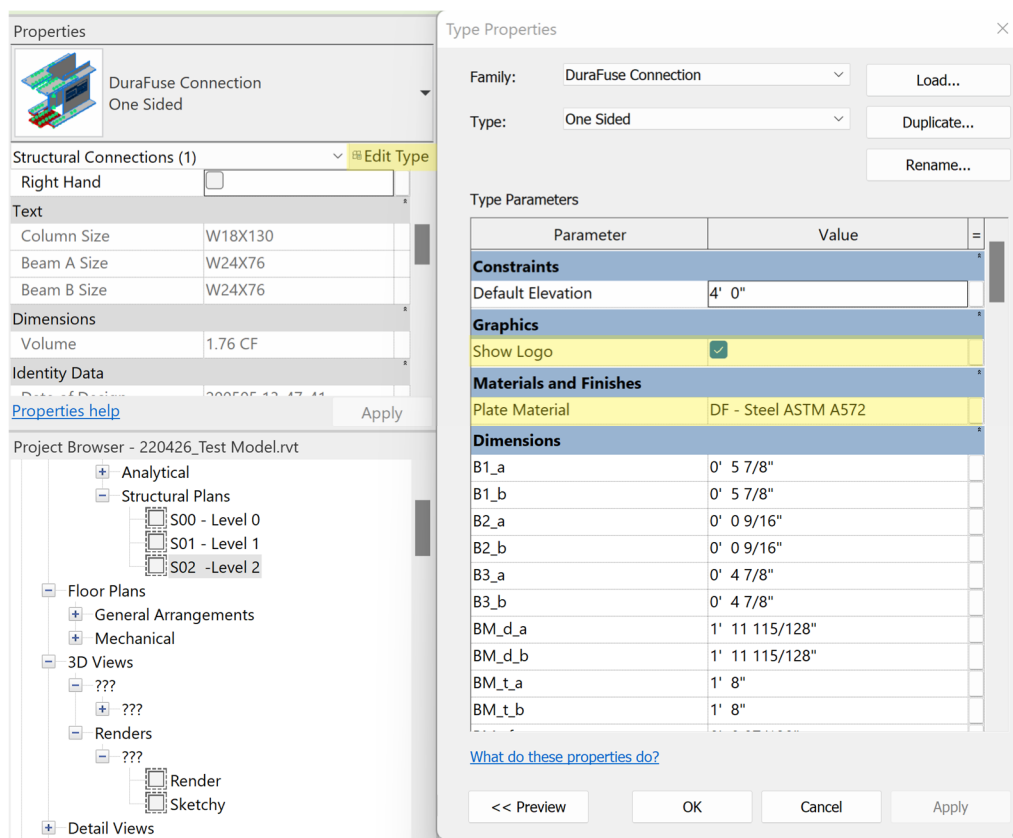


Figure 5-6. Modify Family Features

## 6 Manual Application

If the user chooses to apply the connection manually instead of using the Connection Mapping Tool (see Section 4), use the following steps to apply the family in the model.

1. Access the family through the project browser under the **Families** and **Structural Connections** (see Figure 6-1). Click and drag the family type desired onto the screen.

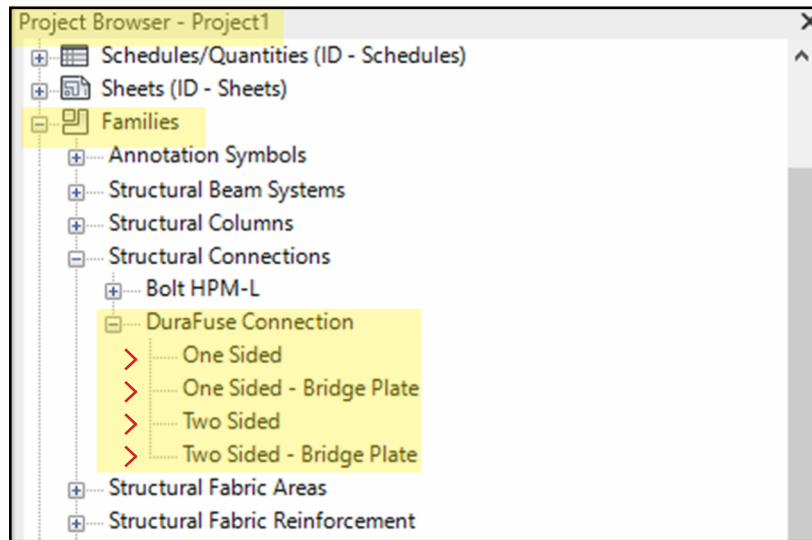


Figure 6-1. Location of DuraFuse Frames Revit Family

2. An alternative way to access the family is by selecting the **Structure** ribbon and the **Component** icon. Select **Place a Component** and locate the **DuraFuse Connection** option from the drop-down menu that appears in the Properties menu (see Figure 4-2).

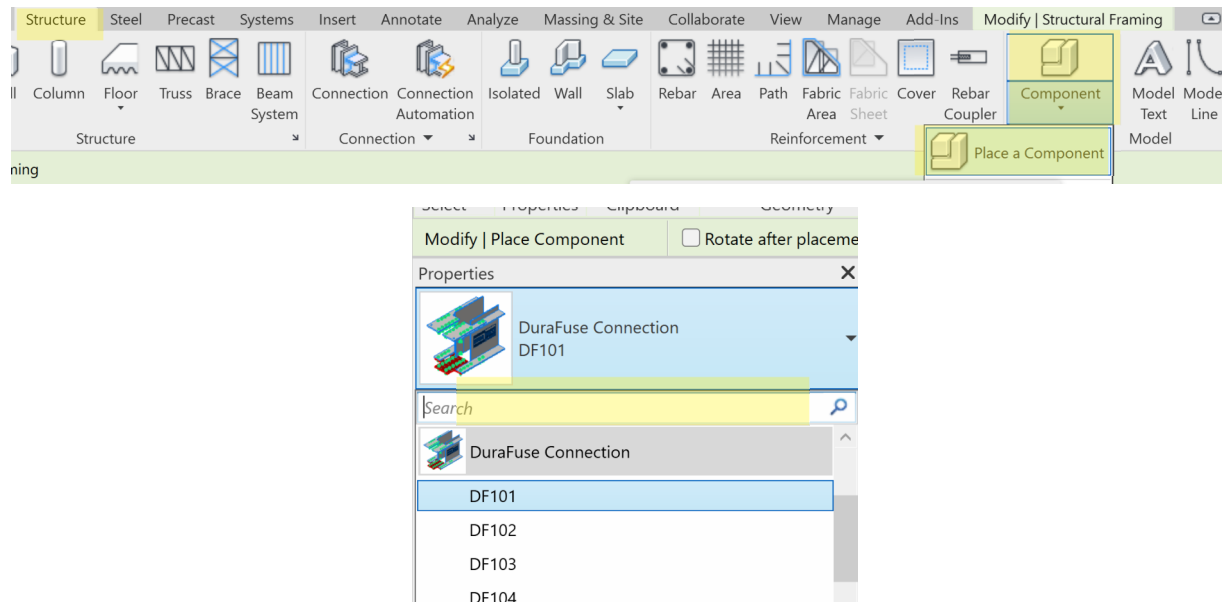


Figure 6-2. Alternative Location of DuraFuse Frames Revit Family

3. Prior to selecting the appropriate connection ID, change the view to **plan view**. This will make placing the family easiest.
4. Select the DuraFuse Frames specific connection ID and change the placement from **Place on Face** to **Place on Work Plane** (see Figure 6-3). These icons will pop up when placing the family in

the model. This allows the user to specify a level in Revit to apply the component. The insertion point is the center of the column; the family will be properly aligned when the user snaps to the center points of the column or cross-hairs of each grid.

5. Hitting the space bar prior to placing the family in plan view, rotates the family perpendicularly. Hit the space bar as many times as needed to get the proper orientation. Once placed, blue arrows will appear when the cursor hovers over the family. Clicking on these arrows also changes the orientation of the family once it has been placed.

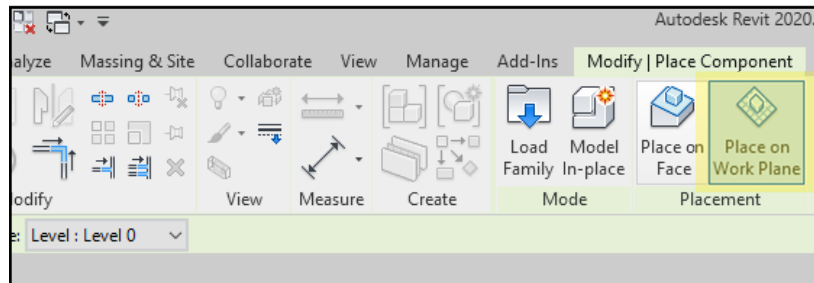


Figure 6-3. Place Family on Work Plane

6. Repeat these steps to place more connections at other locations in the model.

## 7 Specific Information for Included Configurations

The DuraFuse Frames Revit family can accommodate several different configurations including the following:

- One-Sided
- Two-Sided Same Beams
- Two-Sided Different Beams

See the following sections for details on modelling these specific conditions.

### 7.1 ONE-SIDED CONNECTIONS

A one-sided connection includes a single moment frame beam connecting to a column. A typical detail of a one-sided connection modelled in Revit is shown below.

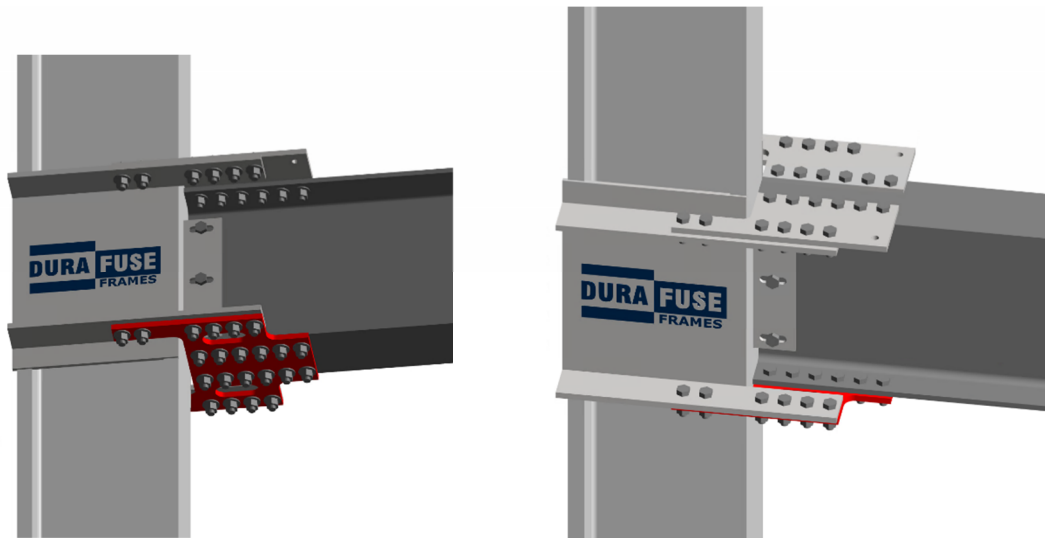


Figure 7-1. One-Sided DuraFuse Frames Connection (Bottom, Top Views)

## 7.2 TWO-SIDED SAME BEAM CONNECTIONS

A two-sided connection includes two moment frame beams of the same size. The same parameters are used for both beams. A typical detail of a two-sided same beam connection is shown below.

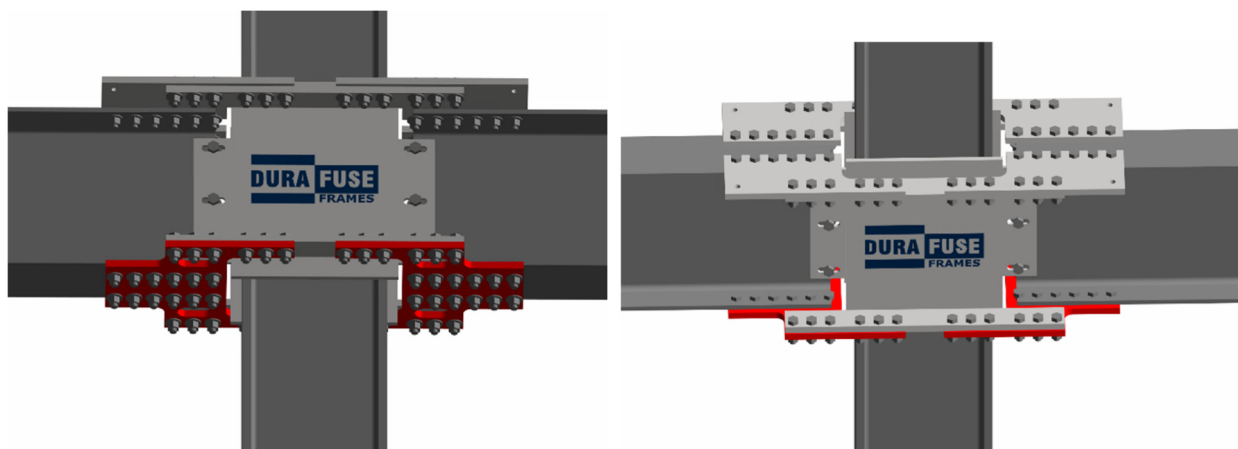


Figure 7-2. Two-Sided DuraFuse Frames Connection (Bottom, Top Views)

## 7.3 TWO-SIDED DIFFERENT BEAM CONNECTIONS

The DuraFuse Frame Revit family can accommodate two-sided conditions with two different beams. However, only the manual application of the family will work for this case. The connection mapping tool will not work for this case. If this type of connection exists on the project, please manually place the connection in the model. The connection mapping tool will still work for all other connections, but for these conditions, they should be updated and placed manually.

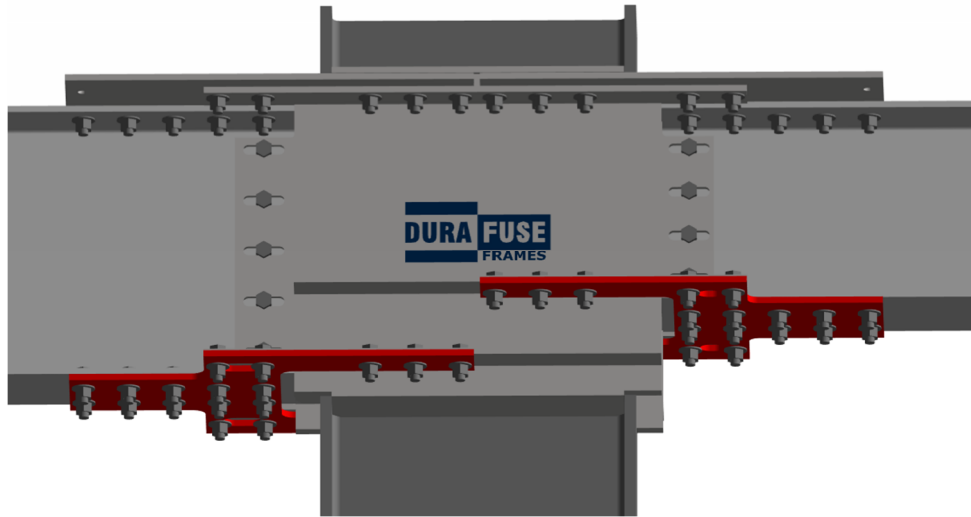


Figure 7-3. Two-Sided, Different Beam DuraFuse Frames Connection

Once placed in the model, if the connection is flipped and does not line up with the appropriate beams, use the following steps:

1. Select the connection in the model.
2. Right click and select Flip Hand.
3. This will flip the connection to align with the opposite beams.

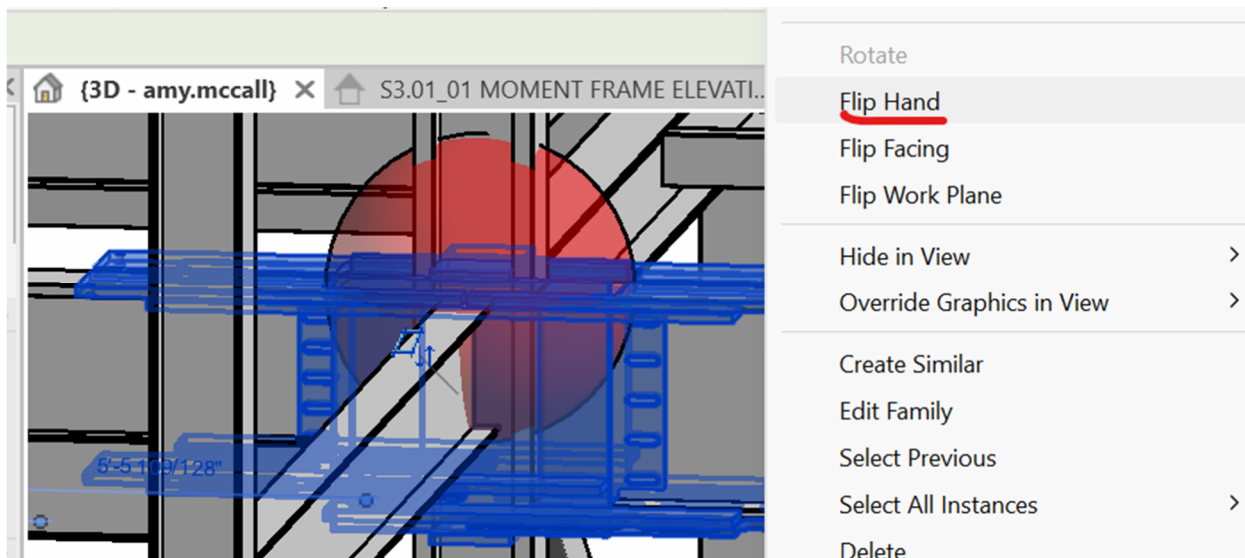


Figure 7-4. Align Two-Sided Different Beam Conditions Using Flip Hand

## 7.4 LIMITATIONS

### 7.4.1 Miscellaneous Configurations

Not currently included in the DuraFuse Frames Revit family are biaxial conditions, cap plates, slopes, steps or combinations of these types. While these conditions are not included, a family can still be applied to locations with these conditions. However, the connection will not be drawn accurately. For

example, Figure 7-5 shows a two-sided connection with the beam on the right having a slope. The family still shows up, without any errors, but on the side with the sloped beam, the connection is incorrectly displayed. It should look more like what is shown in Figure 7-6, where the connection slopes with each beam.

For any of these conditions not currently included in the family, please reach out to DuraFuse Frames for appropriate modeling.

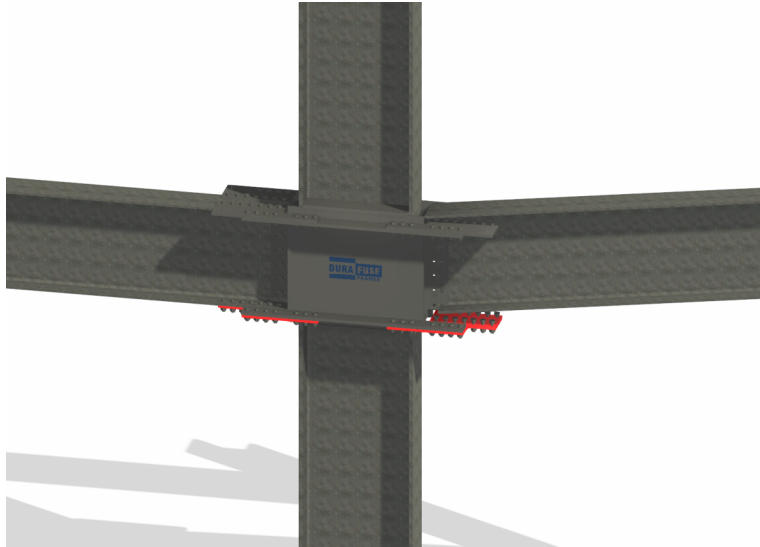


Figure 7-5. Incorrect Sloped Condition

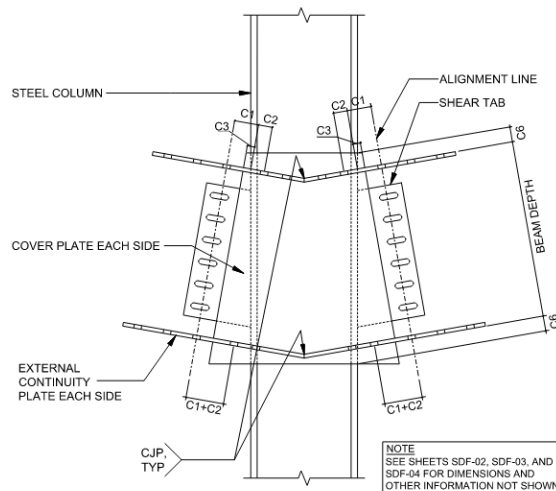


Figure 7-6. Correct Sloped Condition

#### 7.4.2 DuraFuse Project Specific Text File

Within the project specific DuraFuse Connection.txt file, there may be connection ID's with the same beam and column combinations. This may occur for example, when there is a top story condition with a different ID than a typical floor ID. When the mapping tool runs, it will look for the first ID with matching

beam and column in the .txt file. When the wrong connection ID has been applied, the user will have to manually update the applied connection with the appropriate ID.

This can be done by selecting the connection in the model (see Figure 7-7). In the Properties dialog to the left, select the drop-down box and select the correct ID that should apply. This will automatically update the connection with the correct ID and associated properties.

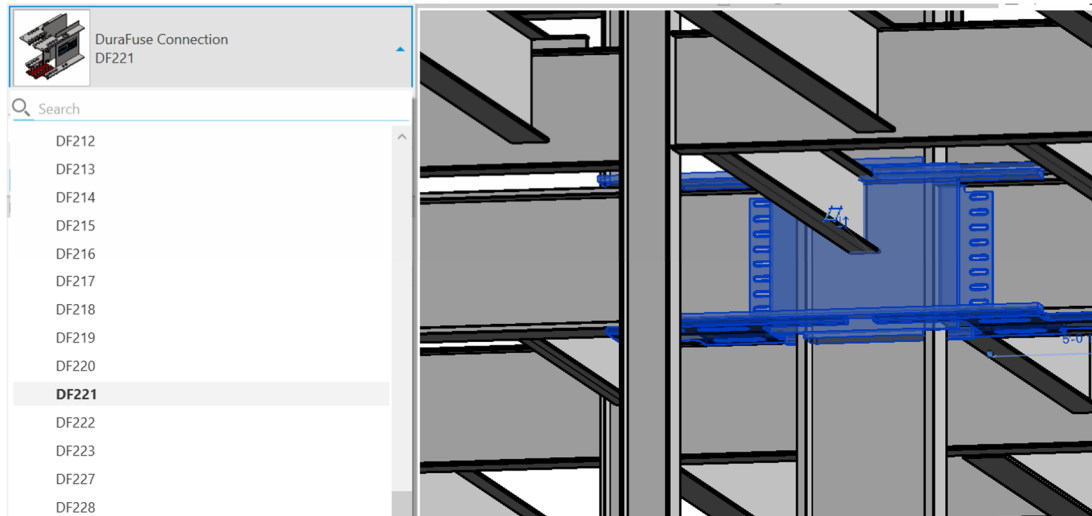


Figure 7-7. Manually Updating a Connection ID.