Installation & User Guide

DuraFuse Frames® SDS2 Component v1.5

SDS2 2025

SDS2®

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1 Overview

The **DuraFuse Frames® (DFF) connection** is a structural system composed of plates, welds, and bolts designed to enhance moment frame performance. To streamline the detailing process in SDS2, the **DFF SDS2 component** was developed. This component allows users to quickly apply the DFF connection to moment frame joints within an SDS2 model.

Once applied, the component automatically generates and updates all associated plates, welds, and bolts for each connection using the **XML Import Tool**. This automation significantly reduces manual input and ensures consistency across the model.

The flowchart below outlines the step-by-step process for applying the DFF SDS2 component within your project.

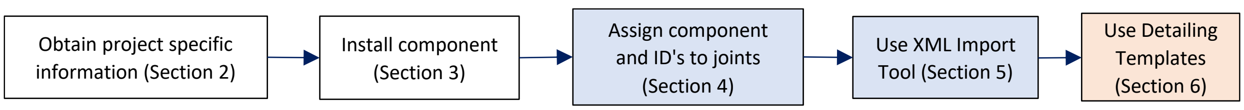


Figure 1. DuraFuse Frames SDS2 Component Application Flow Chart

2 Project Specific Information

Before applying the DFF SDS2 component in a model, obtain project-specific information from DuraFuse Frames®. This information ensures the component is configured correctly for your project.

You can request this information using one of the following methods:

- **Contact the DFF engineer** assigned to your project
- **Phone**: 801-727-4060
- **Email**: contact@durafuseframes.com

The project-specific information typically includes:

- Frame elevations with connection IDs
- An XML file for import
- (Optional) Connection schedules

Figure 2 shows an an example of a frame elevation, which identifies where each connection ID should be applied. Use this as a reference when placing connections in your SDS2 model. For more details, see Section 4.

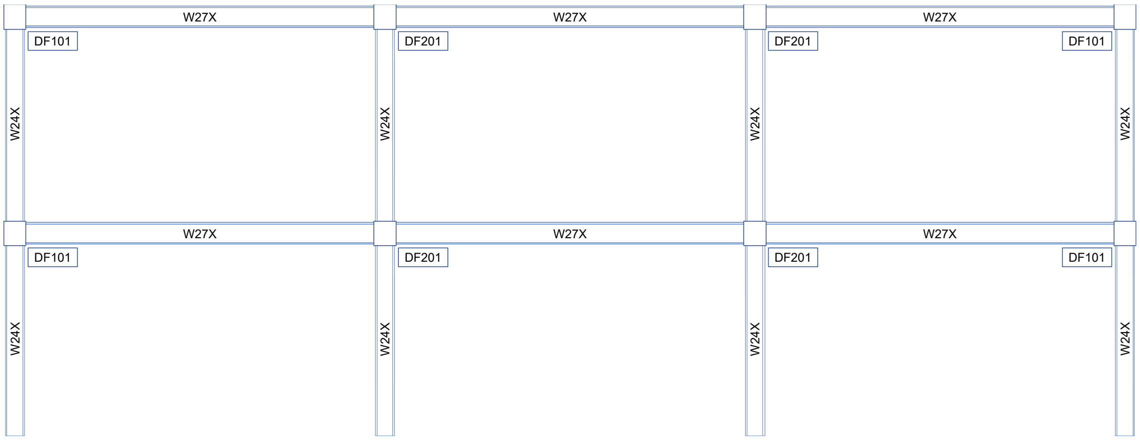


Figure 2. DuraFuse Frames Elevation Example

The XML file is a project specific file that contains all connection information for each ID from the DFF schedules. The files may look like the following, where the file name includes *DuraFuse Connection* followed by the date, time and the *.xml* extension:

DuraFuse Connection_220106 14_46_31.xml

The XML file can be renamed to anything the user prefers and will still be compatible with SDS2 and the component. Data within the XML file is organized by *Project Data*, *Global Data*, and each individual *DuraFuse Components* for each unique ID, see an example in Figure 3. **Save** this file to a known location prior to using the component tool and assigning ID's.

```
<DuraFuseProject>
   <ProjectData>
      <Version>1.0.1</Version>
      <FileType>XMLExport</FileType>
      <Author>   </Author>
      <ProjectName>0</ProjectName>
      <ProjectNumber>XXXXXX-00</ProjectNumber>
      <ProjectEngineer>0</ProjectEngineer>
      <TimeStamp>01/06/2022 14:46:31</TimeStamp>
   </ProjectData>
   <GlobalData>
      <UnitsLength>Inches</UnitsLength>
      <UnitsAngle>Degrees</UnitsAngle>
      <NumberOfCnxns>15</NumberOfCnxns>
      <MemberMtlGrade>A572-50</MemberMtlGrade>
      <BoltGrade>F2280X</BoltGrade>
   </GlobalData>
   <DuraFuseComponent>
      <Members>
         <ID>DF101</ID>
         <ColumnSize>       </ColumnSize>
         <TotalNumOfBeams>1</TotalNumOfBeams>
         <WeldHBDefault>      </WeldHBDefault>
      </Members>
```

Figure 3. XML File Sample Data

Figure 4 shows blank connection schedules for parameters associated with each connection ID. DFF may provide drawings that include these schedules specific to each project. The parameters in the schedules are what make up the data included in the XML file, which are then auto populated for each connection in the *DuraFuse Component Dialog* (see Section 7).

	MEMBER SIZES		PLATE THICKNESS			DIMENSIONS						WELDS				BOLTS PER CONNECTION (EACH SIDE)					
ID	BEAM	COLUMN	T1	T2	T3	C1	C2	C3	C4	C5	C6	W1	W2	W3	W4	DIA	SPACING	M	P	N	B
DF101																					
DF102																					
DF103																					
DF104																					

	MEMBER SIZES		TOP PLATE DIMENSIONS					FUSE PLATE DIMENSIONS							SHEAR TAB			BEAM DIMENSIONS		
ID	BEAM	COLUMN	P1	P2	P3	P4	P5	F1	F2	F3	F4	F5	F6	F7	S1	S2	S3	B1	B2	B3
DF101																				
DF102																				
DF103																				
DF104																				

Figure 4. DuraFuse Frames Schedules (Blank)

3 Installation

Prior to installation of the DuraFuse component, be sure that **SDS2 2023** or newer is installed on the working machine. If SDS2 2023 has not been installed, please visit http://www.sds2.com/support/releases to download the appropriate SDS2 release.

For compatibility with previous versions, contact DuraFuse Frames. Please note that older versions do not include the enhancements introduced in the latest release.

NOTE: OLDER VERSIONS OF THE COMPONENT WILL NOT INCLUDE UPDATES MADE TO THE COMPONENT.

The component can easily be downloaded and installed from the DFF or SDS2 websites. The installer will automatically place the component into the plugins/Toolbox folder. It will also install the Detailing Templates into the SDS2 templates folder. Once installed, a toolbar can be added in SDS2 that will make it easy to apply the component in the model.

3.1 OBTAIN THE INSTALLATION PACKAGE

Obtain the component installation package from one of 3 sources:

1. Download the package from **durafuseframes.com/resources/** and scroll down to **Downloads**.
   a. After logging in, locate the SDS2 component and select **Download**.
   b. Register and **log in** to receive updates.
   c. Go to the **Resources** page.
   d. Locate the SDS2 Component and select **Download**.
   e. Save the installation package to a known location.
2. Download the package from **https://sds2.com/toolbox/durafuse-frames**.
   a. Select which version of the component to download (compatible with 2020 and newer).
   b. Fill out the contact information so DFF can send notifications for updates made to the component.
3. Contact DFF directly to receive the installation package.

Phone: 801-727-4060
Email: contact@durafuseframes.com

Once installed, the component includes three parts:

1) DuraFuse Frames Component: applies the component to selected column-beam joints. User assigns a connection ID to each applicable joint, and connection parameters are later updated by the XML import.

2) XML Import Tool: the user links and imports an XML file with connection parameters for all ID's (XML file provided by DFF). This populates any assigned connection ID's in the model with matching ID's from the XML file.

3) Detailing templates will be installed, which are customized for the DFF R8 connection. Refer to Section 6 for more information.

3.2 INSTALL THE COMPONENT

To install the component and templates, log in as an Administrator. After component has been downloaded from any of the sources provided in Section 3.1, double-click on the executable file to launch the installation wizard. Any users who would like to use the component will need to install it individually.

NOTE: WHEN PROMPTED, SELECT 'YES' TO ALLOW INSTALLATION TO CONTINUE AND MAKE CHANGES TO THE SYSTEM.

The installation will start with a Welcome screen, as shown in Figure 5, with a wizard to help with the installation process. Click **Next**.

Figure 5. Welcome Screen

After selecting Next, the installer should automatically find the path for the *Data Files* folder, as shown in Figure 6. If the path is incorrect, select the button to the right ... and browse to the SDS2 202X (current version) data directory. If the path is correct, click **Next** and then **Install**. The installer will then copy the files to the appropriate location. Once the installer is finished, click **Next** and then **Finish**.

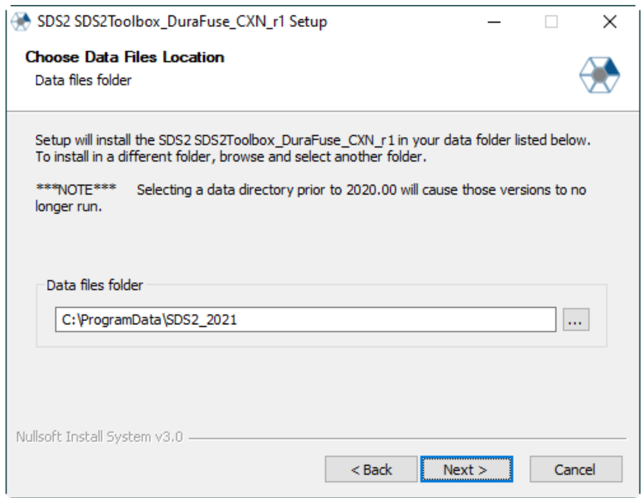


Figure 6. Choose Data File Location

3.3 ADD DURAFUSE COMPONENT TOOLBAR

Use the following steps to add the main component and XML Import tool to a customized toolbar:

1) On the main SDS2 screen select **Utilities – Plugins Manager** (Figure 7).
2) Scroll down in the *Plugins Manager* window for "DuraFuse". The DuraFuse_CXN and Update XML tool will be in the list.
3) Select them both and click the right **arrow** button to move them over to the *Job plugin* section.
4) Select **Close**.
5) Back on the *Home* screen, select **Utilities – Customize Interface** (Figure 8).
6) Select the *Default* and select OK.
7) When the *Customize Interface* window comes up, Select **Detailer (Modeling)** (Figure 9).
8) Over to the right, on the same line as *Ribbon configuration*, select **Edit**.
9) When the *Modelling Ribbon Editor* shows up, search for "DuraFuse" in the *Menu item search box.*
10) Create a new "Page" by using the "**+**" button next to *Page*. Give it a title (Figure 10).
11) Once the new page has been created, use the "**+**" button next to the DuraFuse components to move them to the right and add them to the new page (Figure 10).
12) Click the "X" to close and save the toolbar.
13) A new DuraFuse toolbar will show up in the SDS2 ribbon with quick buttons for the main component and XML import tool (Figure 11).

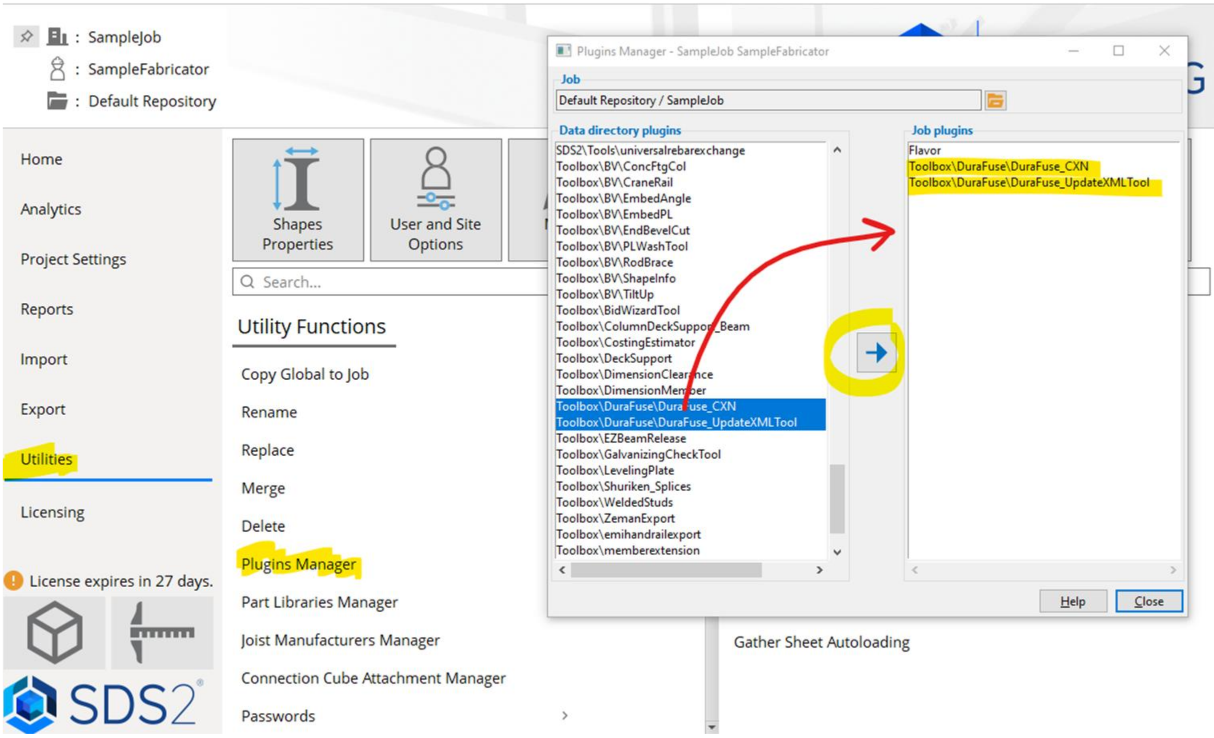


Figure 7. Plugins Manager

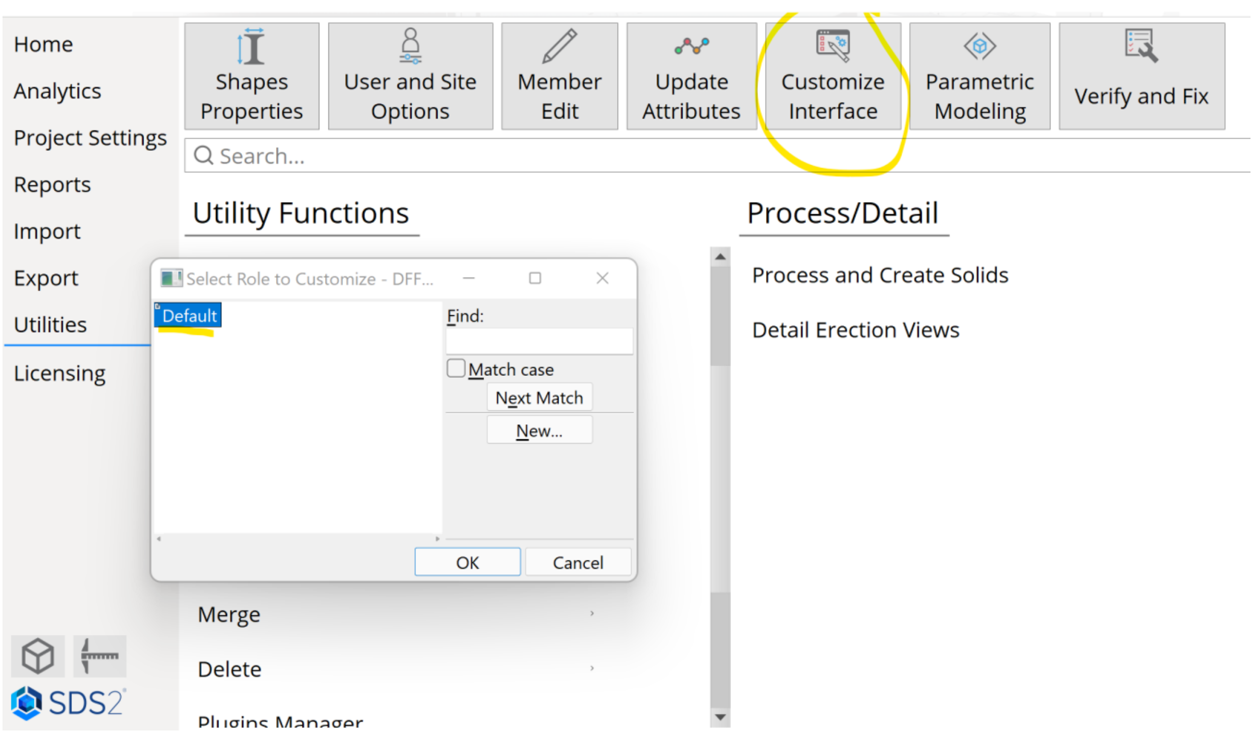


Figure 8. Customize Interface

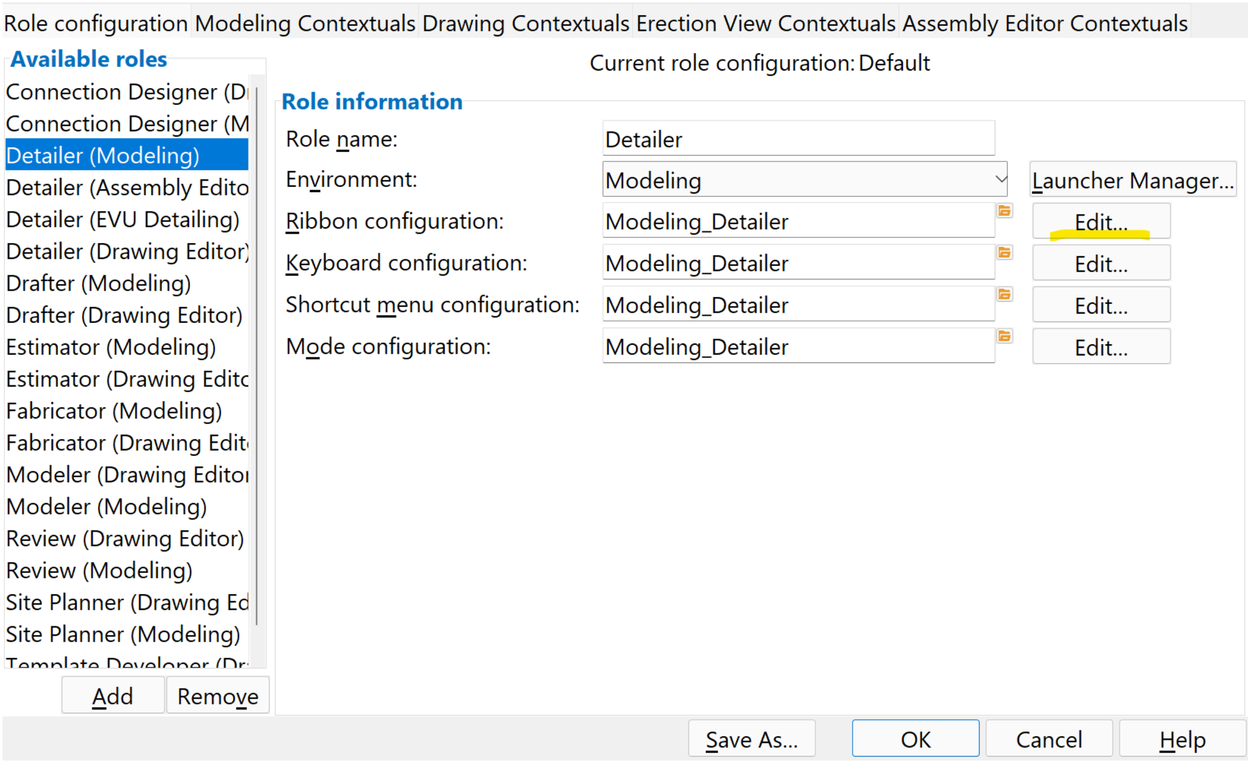


Figure 9. Customize Interface Window

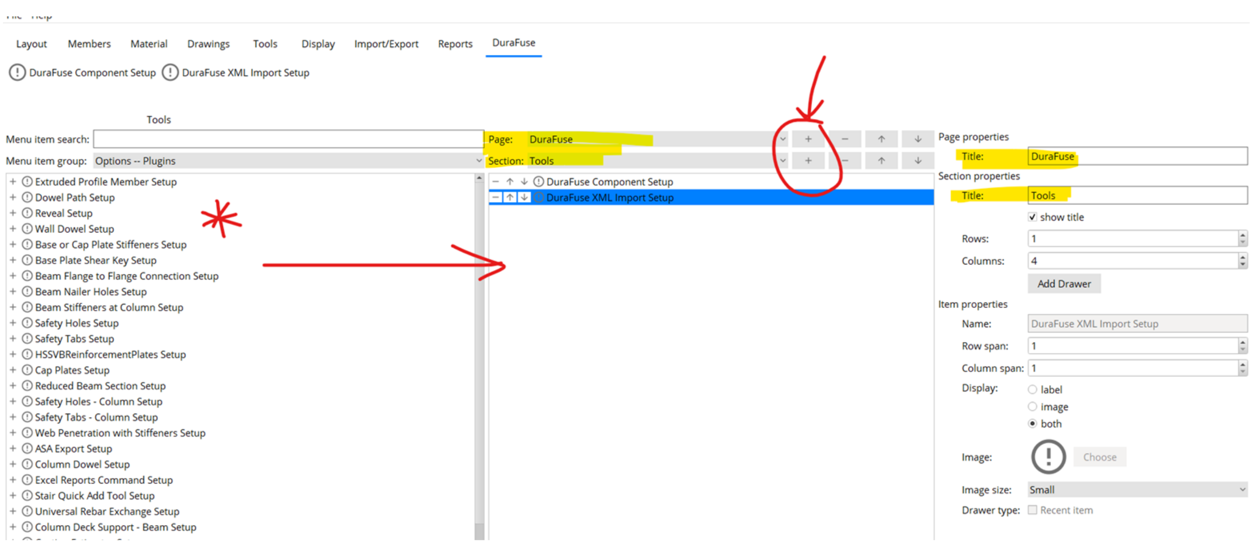


Figure 10. Add New Page with DuraFuse Frames Components

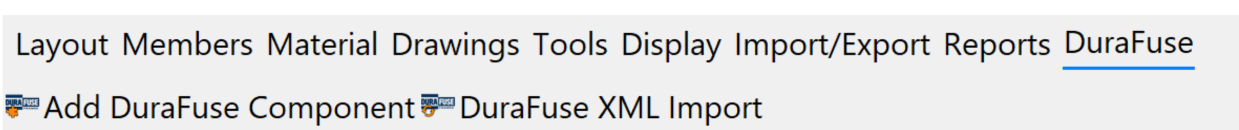


Figure 11. DuraFuse Frames Custom Toolbar

4 The DuraFuse Frames SDS2 Component

The DFF SDS2 component can be applied in two ways:

1) **Automated Application via Member Tagging**: This method uses the project-specific XML import file to automatically assign and apply the component based on predefined connection IDs.
2) **Manual Application**: Users can manually place the component on each moment frame connection.

Refer to the following sections for detailed instructions on each method.

4.1 DFF MEMBER TAGGING

The following rules should be considered when using the DFF member tagging feature:

- Beams shall be parallel to the web of the column (no skews).
- Beam end points shall be modelled touching the column insertion line.
- Connections will be treated as a single sided connection, unless beam end points share the same point intersecting the column line.
- Column and beam sizes must match those in the XML file.
- Gravity beams should not be included as part of the tagged members.

Use the steps below for the DFF member tagging feature:

1. Select all DuraFuse beam and column members.
2. Right click and select **Edit**.
3. When the dialog opens, select **Properties**.
4. Expand **DuraFuse** and select the box next to the **DuraFuse Cnxn Tag**:

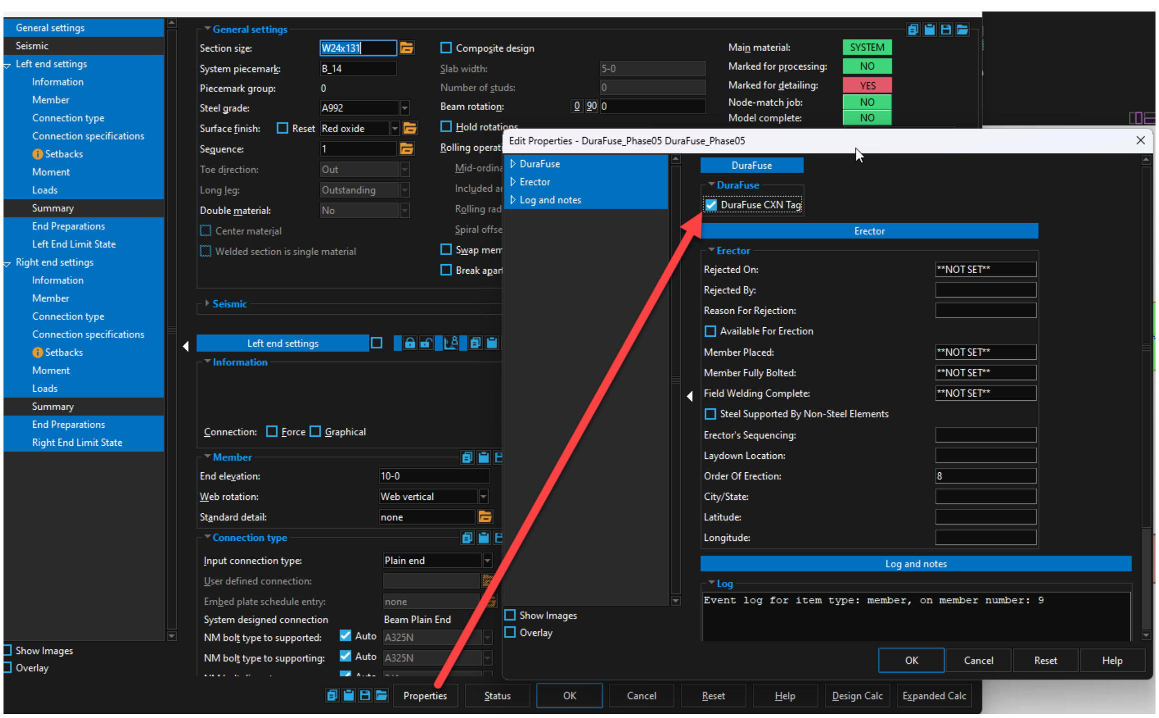


Figure 12. DuraFuse Tagging Method

5. Once all appropriate DuraFuse members have been assigned with the DF tag, proceed by importing the project specific XML file, see Section 5.

NOTE 1: WHEN CONNECTION ID'S HAVE THE SAME BEAM AND COLUMN COMBINATIONS, THE FIRST CONNECTION ID IN THE XML THAT MATCHES THE BEAM-COLUMN COMBINATION IN THE SDS2 MODEL WILL BE APPLIED. THE USER WILL NEED TO MANUALLY UPDATE THE ID IF IT IS NOT CORRECT. FOR EXAMPLE, IF CONNECTION ID DF101 AND DF102 ARE IDENTICAL IN BEAM AND COLUMN SIZE BUT ONE IS A ROOF CONDITION OR DRAG CONDITION, THE USER WILL NEED TO UPDATE TO ID DF102, WHERE APPROPRIATE.

NOTE 2: THE TAGGING FEATURE IS NOT APPLICABLE FOR STEPPED OR SKEWED CONDITIONS.

4.2 MANUAL APPLICATION

Specific connection conditions may require the manual application of the component (e.g., stepped conditions, connection ID's that have the same beam combination but differ in other parameters such as roof conditions, etc.). For these conditions, look up the column-beam combinations and corresponding ID's from the frame elevations provided by DFF. Then, apply the component manually using the following steps:

1. Select the component button (puzzle icon) 

2. Select the column first
3. Holding the shift key, select the main beam
4. If there is a second beam, select it while still holding the shift key. Column and beam(s) should all be selected, see Figure 13.
5. Right click and select **OK** and the *DuraFuse Component Dialog* will pop up.
6. Under *General Settings*, indicate the **Custom ID** (see Figure 14) and select the box next to **CXN Placeholder Override**.
7. Select **OK** to close the *DuraFuse Component Dialog*. The component will be applied to the joint.
8. Repeat steps 1-6 for all DFF connections in the model.
9. Once the XML file is received, proceed to load the XML file. See Section 5, *XML Import Tool* for more details.
10. If a **Connection ID** needs to be changed, double click on the component and the *DuraFuse Component Dialog* will pop up. Use the drop-down list to change the ID to options included in the XML file. See Section 7 for more information on the *DuraFuse Component Dialog*.

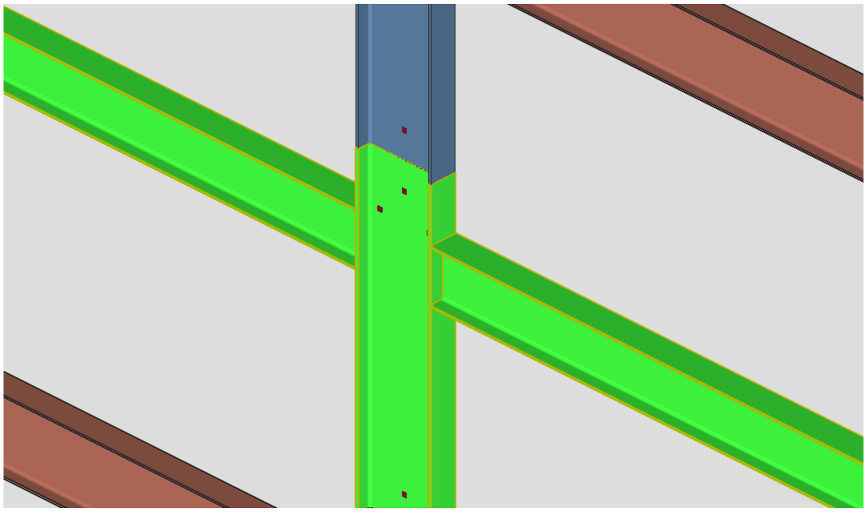


Figure 13. Select Members

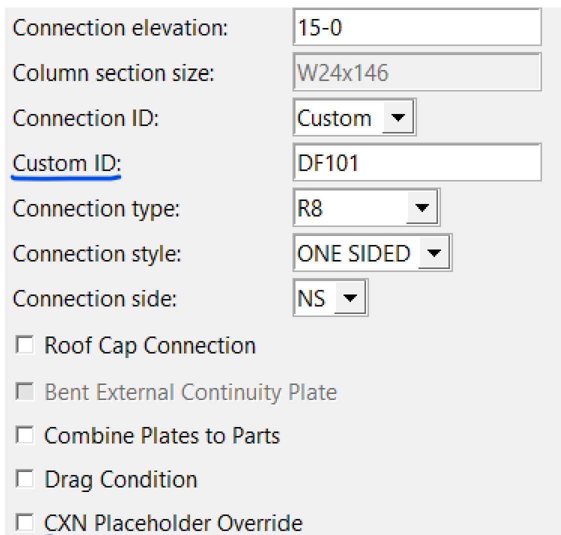


Figure 14. Manual Application Settings

4.3 SAVING FORMS

If a user chooses to manually create a connection without using parameters specified by DFF or imported from the XML, forms should be used. ID. Use the following steps to create, save and re-use forms:

1. Enter all parameters for a single connection ID.
2. Select the save button at the bottom of the *DuraFuse Component Dialog,* see Figure 15.
3. Choose the location to save and name it after the connection ID, see Figure 16.
4. For a new location with a newly added component, select open when the component dialog opens, and select the form ID to apply to the joint.
5. Select open and the parameters will populate the input boxes.

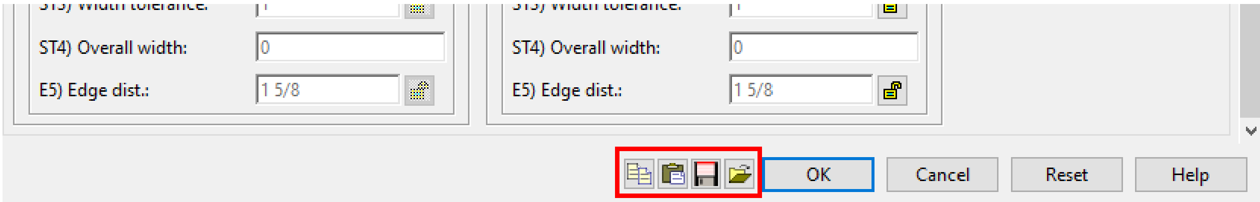


Figure 15. Save or Open Form

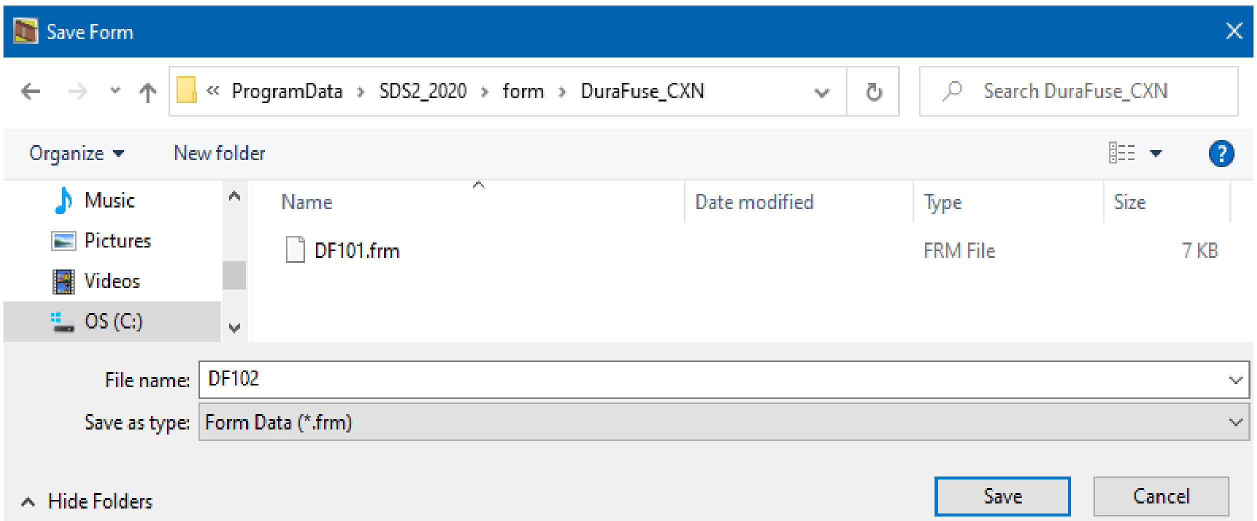


Figure 16. Save Form Dialog

5 XML Import Tool

The **XML Import Tool** automatically loads connection data from the project-specific XML file into the DFF SDS2 components in the model.

Before using the tool, make sure all **connection IDs** have been assigned in the model (see Section 4). The tool will match these IDs with the data in the XML file and update each DFF component with the correct **plates, welds, and bolts**.

This process auto-fills the input fields in the **DuraFuse Component Dialog**, eliminating the need to manually enter schedule information.

Follow the steps below to use the XML Import Tool.

1. Once all the connection ID's have been assigned in the model, select the **DuraFuse XML tool** (sync icon)
2. After selecting the XML tool, the main dialog will pop up. **Browse** to the saved XML file as shown in Figure 17.
3. Select the button **Import XML Data to DuraFuse Components** (see Figure 18). This will import all the connection information for each connection ID assigned in the model

NOTE: IF AN XML FILE IS IMPORTED, DATA IN THE DURAFUSE COMPONENT DIALOG WILL BE OVERWRITTEN.

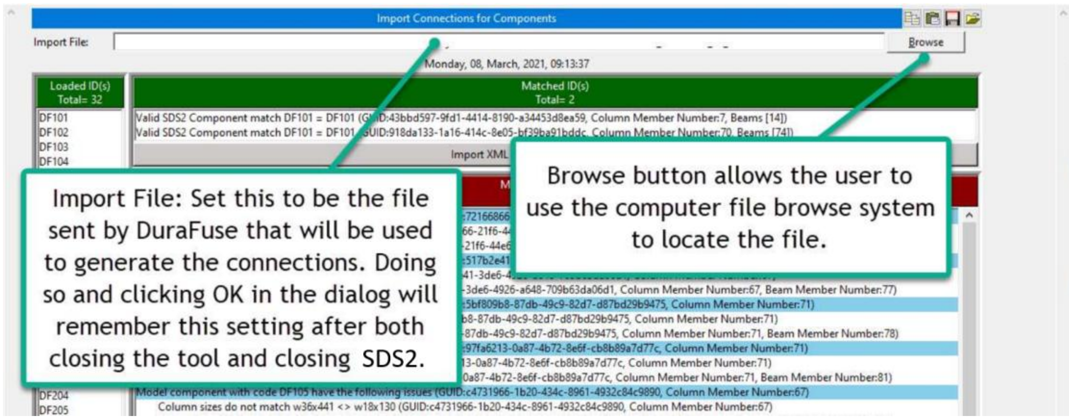


Figure 17. Locate and Import XML Data

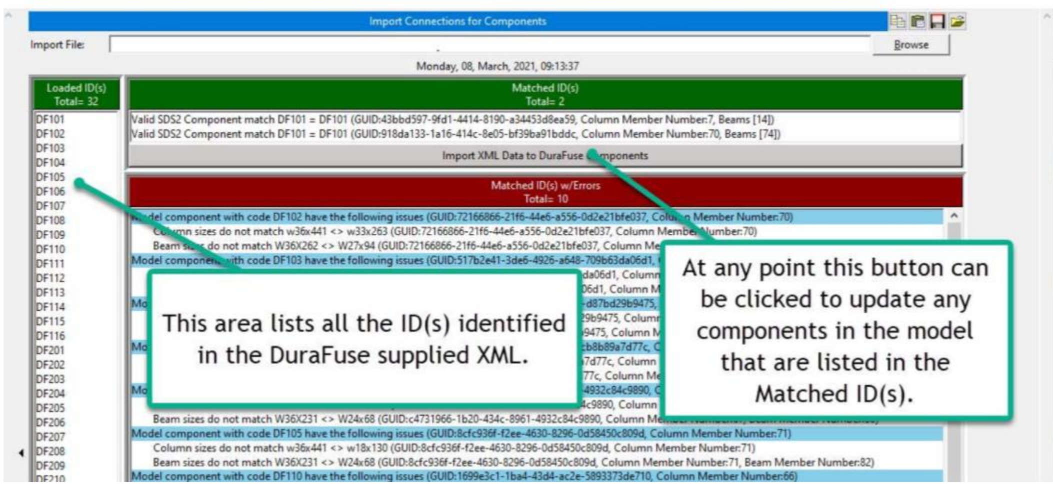


Figure 18. Update the XML and Identified Connection ID's

4. Once the import is complete, there are several sections in the dialog that will let the user know if the components were added successfully or if there are any errors. See Figure 19 through Figure 22 for an explanation each section of the window. Reported items:

   - Number of components read from XML file
   - Number of components found from the model
   - Number of components applied correctly
   - Number of components that have member matching errors
   - Number of components not found in the XML file that were assigned in the model
   - Number of components in the model that did not have a connection ID assigned

5. Address any errors and make necessary changes to the model or assigned connection ID's.
6. Once the parameters have been imported and all connections rendered, review each connection for accuracy.

7. At this point, the application of the DFF connections is complete, and the user can move on to using the detailing template in Section 6. For more information regarding the *DuraFuse Component Dialog* or included configurations, see Sections 7 and 8, respectively.

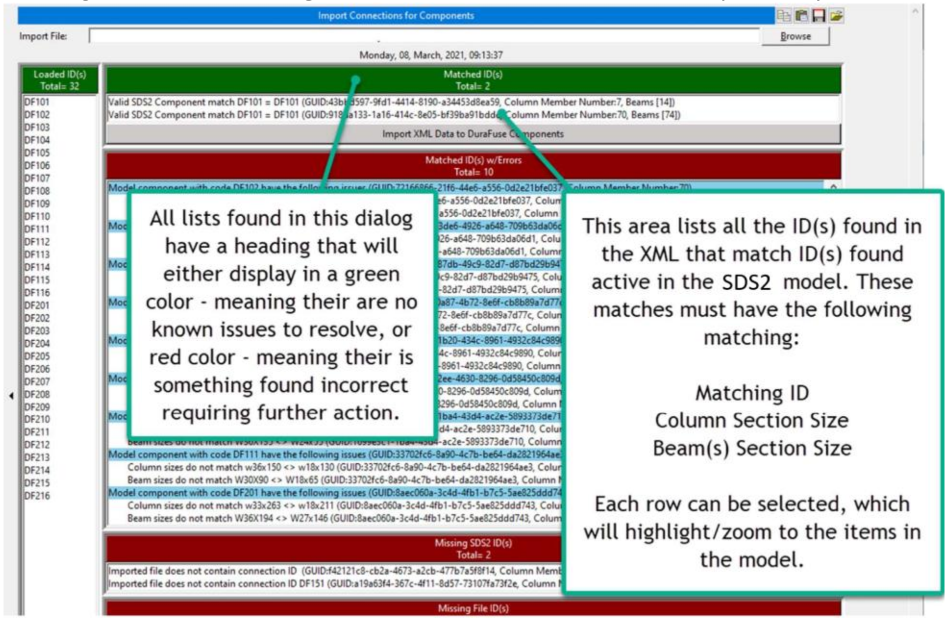


Figure 19. Matched Connection ID’s

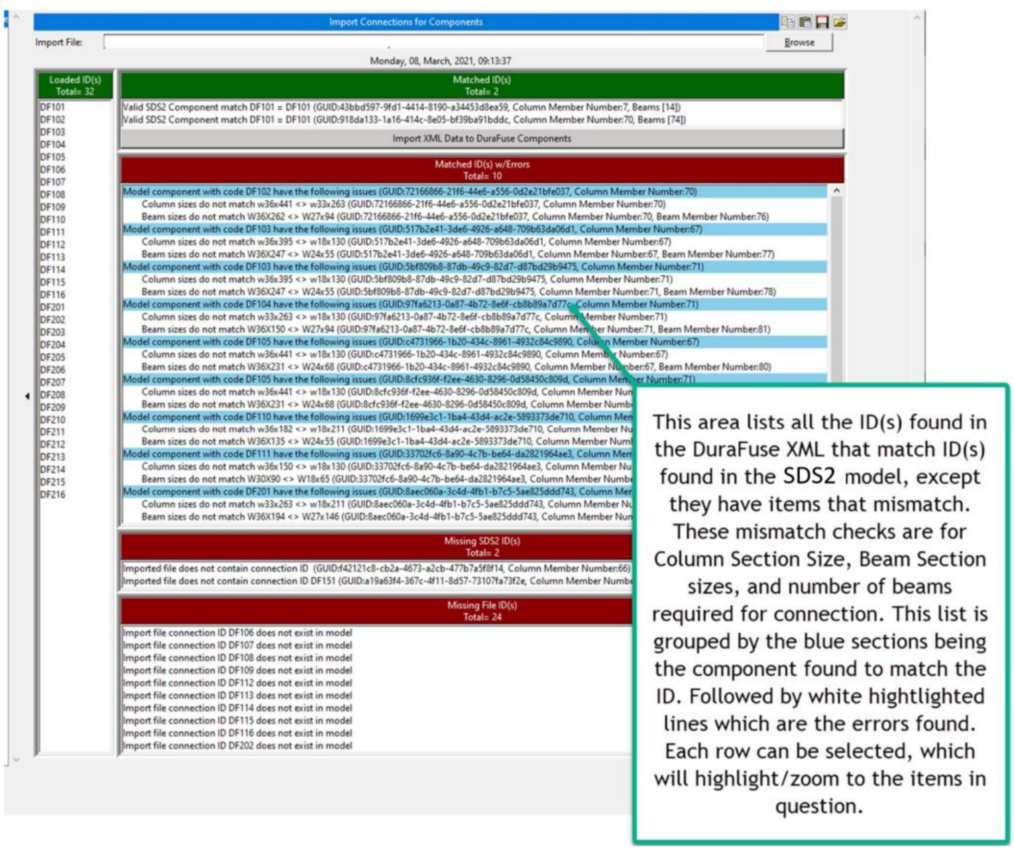


Figure 20. Matched Connection ID’s with Mismatched Members

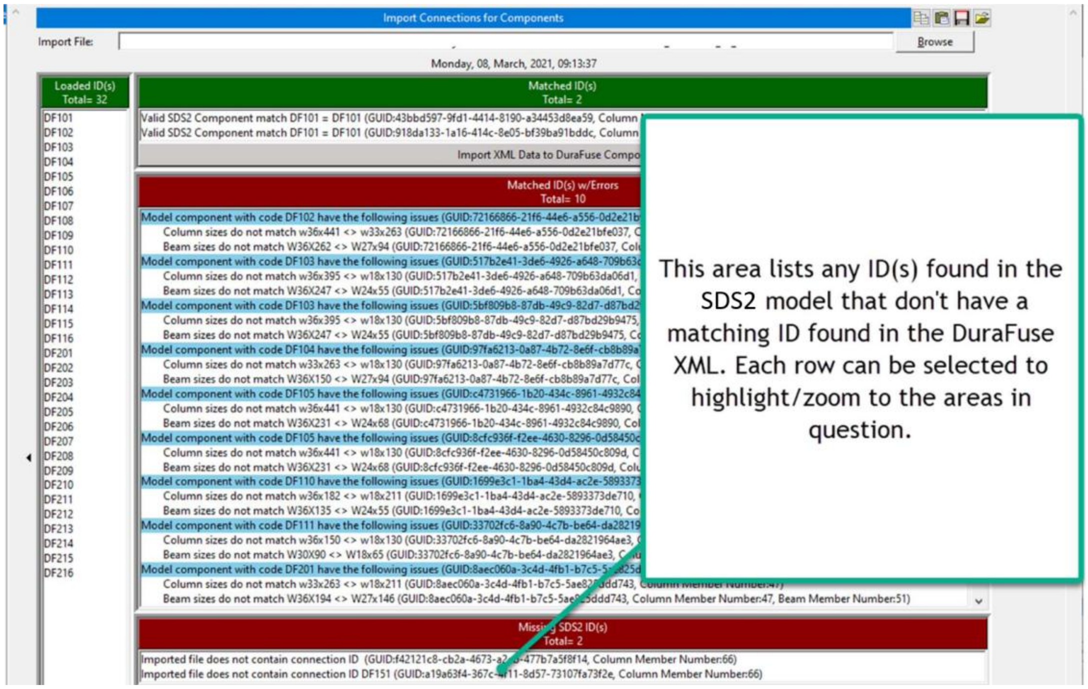


Figure 21. ID's Assigned in the Model That Do Not Exist in the XML File

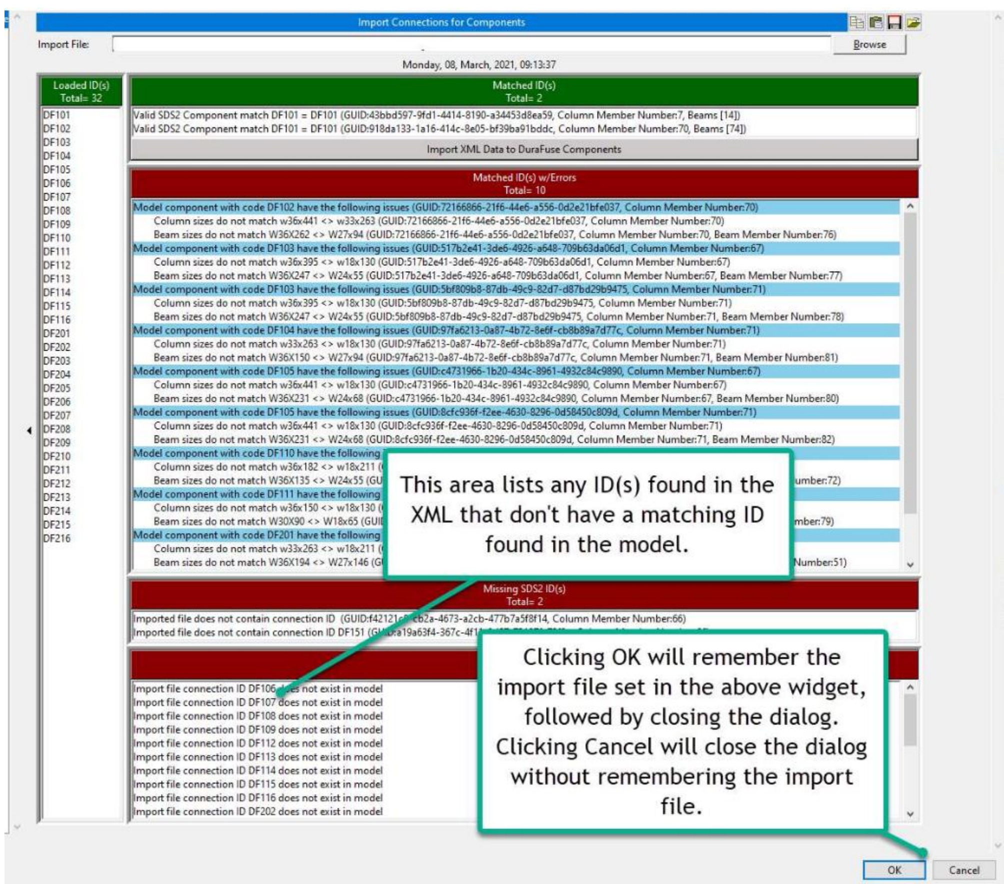


Figure 22. ID's In XML That Has Not Been Assigned in the Model

6 Detailing Templates

The DFF SDS2 component includes built-in **detailing templates** specifically designed for the R8 component. These templates are automatically installed with the component for new projects.

For **existing projects** or after an **SDS2 software update**, the templates may not be present by default. In such cases, the detailing templates must be set up manually before using the component.

The following sections provide instructions for correctly setting up detailing templates in both new and existing projects.

6.1.1 Copying Detailing Templates to Existing SDS2 Projects

Any existing projects can be updated with the new detailing template. If a project was created prior to running the component installer, use the following steps to update the detailing template. Otherwise, new projects can be created without these steps.

1) Open the existing SDS2 project.
2) Select **Utility Functions** from the **SDS2 Main Menu**.
3) Select **Copy Detailing Templates** in **Utility Functions**.
4) On the *Copy Templates Utility* screen (see Figure 23):
   I. Select **Template Folder**. The default path should be the correct location.
   II. Select **Erase existing files from the destination source**.
   III. Click **OK**.

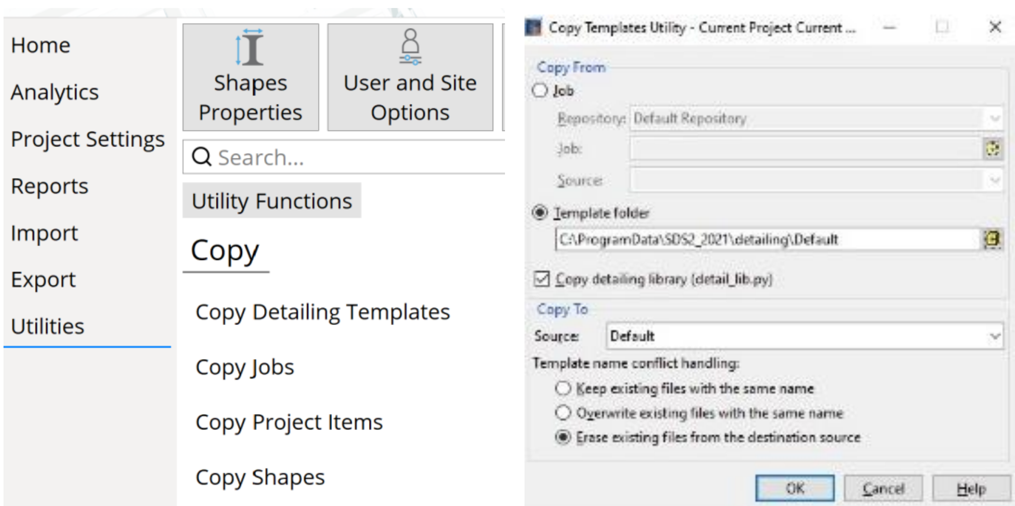


Figure 23. Copy Templates Utility Screen

6.1.2 Copying Detailing Templates to Data Directory

In the SDS2 data directory, there is a *Detailing* folder containing a *Default* and *SDS2* folder. For the first installation of SDS2 software, detailing templates are copied into both folders. However, for additional installations, such as new versions of components or SDS2, only the *SDS2* folder will be updated. This eliminates the possibility of overwriting users' template file modifications in the *Default* folder, which is used when creating new projects. Therefore, when an update is installed for the component or SDS2, the component detailing template will need to be copied from the *SDS2* folder to the *Default* folder for use on new projects.

NOTE: IF MODIFICATIONS ARE MADE TO THE TEMPLATE FILES, PLEASE CONTACT SDS2 SUPPORT FOR HELP IN COPYING FILES

To copy detailing template files from the SDS2 folder to the Default folder:

1) Open the *SDS2* folder in Windows Explorer. The default location is: C:\Program Data\SDS2_202X (current version)\detailing\SDS2.
2) Open the US folder, which is inside the *SDS2* folder.
3) Select all files and right-click **Copy**.
4) Navigate to C:\ProgramData\SDS2_202X (current version)\detailing\Default\US folder and right-click **Paste**.
5) When prompted, choose to **replace the existing files**.

6.1.3 Applying Templates in the Model

The user should perform a few steps to ensure the templates are applied correctly in the model.

Right click on a fuse plate in one of the connections and select **Show Detail**. When the *Annotations and Dimensions* dialog pops up, make sure to turn on the option to **Detail Using Templates,** see Figure 24. Proceed to detail the plate.

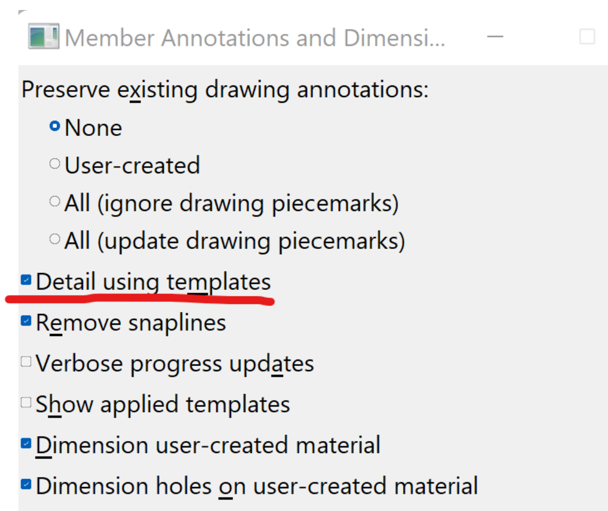


Figure 24. Detail Using Templates

When the detail window shows up, the fuse plate will look like what is shown in Figure 25. Specifically, the fuse plate will be hatched, indicating the protected zone (with accompanying note), and the dimensions shown will be helpful in checking specific DFF parameters included in the schedules. The template also applies other detailing specifics for the column, beam, and other plates for the DFF connection.

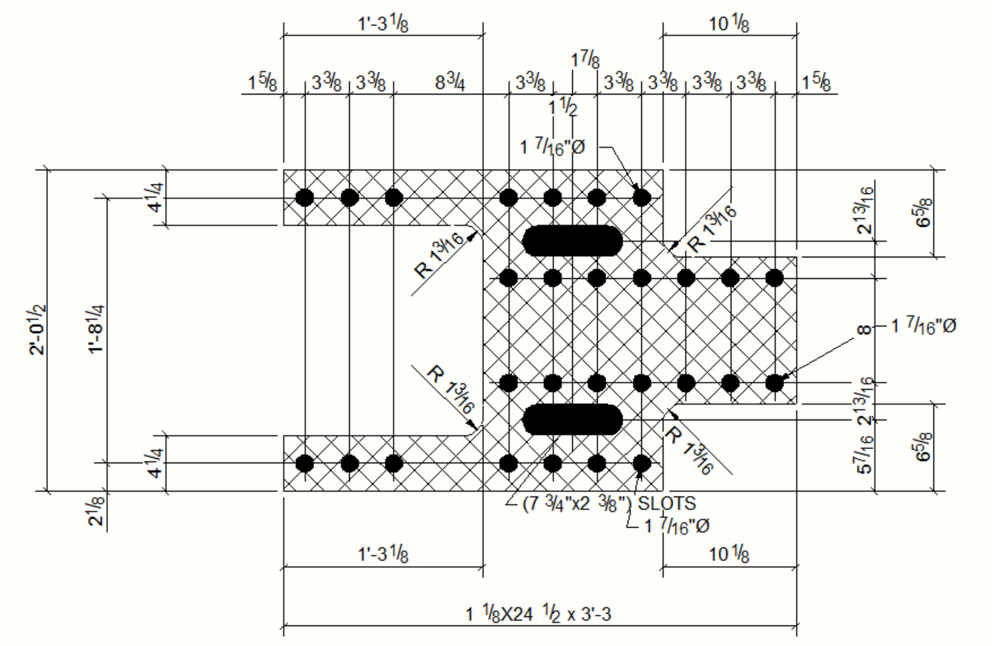


Figure 25. Fuse Plate Detail

7 Component Dialog

The component dialog includes six tabs with information about the DFF component (see Figure 26 below) and each will be discussed in detail in the sections to follow.

- Instructions
- Beam 1
- Beam 1 Plates
- Beam 2
- Beam 2 Plates
- Chamfers

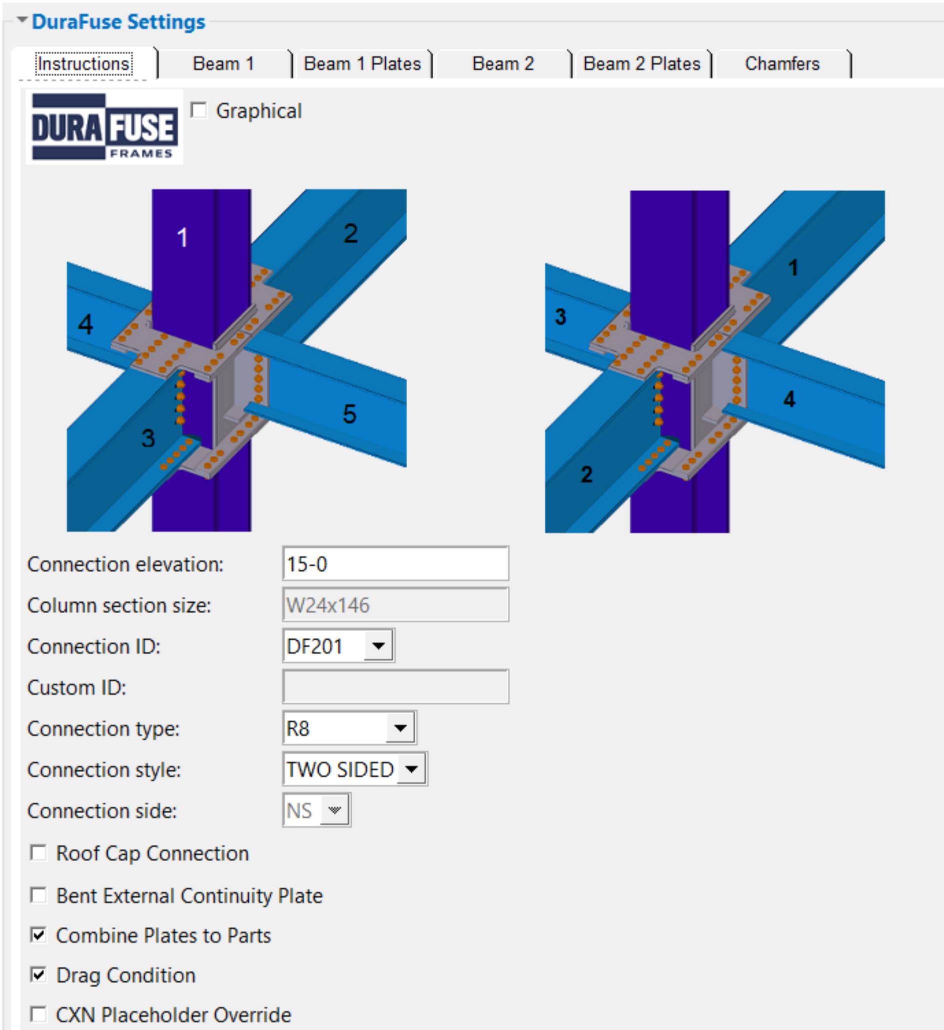


Figure 26. DuraFuse Component Dialog Sections

7.1 INSTRUCTIONS

The instructions tab includes general information about the connection. A *Graphical* option check box indicates whether to keep the component graphical or not. If the check box is not selected (default), then all parameters will be updated automatically. If box is checked next to *Graphical* the component will no longer process and create solids, i.e., it is locked in its current state. A connection will become graphical by any change made to connection materials, welds, holes, bolts, etc. outside of the scope of the component.

Leave the box next to **Graphical** unchecked for typical application, see Figure 26.

Also included on the Instructions tab are the following items, which will be discussed in following sections:

1. Member Numbering Instructions
2. Connection elevation
3. Column section size
4. Connection ID
5. Custom ID

6. Connection type
7. Connection style
8. Connection side
9. Roof Cap Connection
10. Bent External Continuity Plates
11. Combine Plates to Parts
12. Drag Condition
13. CXN Placeholder Override

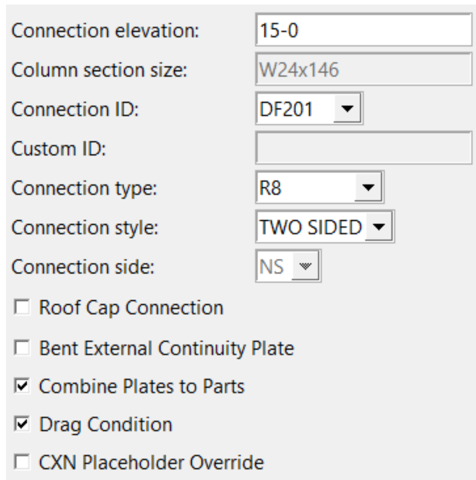


Figure 27. General Settings

7.1.1 Member Numbering

Member numbering shown on the *Instructions* tab is done automatically if the DF tagging method is used (see Section 0). If components are applied manually, the instructions here help the user with member selection ordering.

Select columns first, and then the moment frame beam. If the connection is a two-sided condition, then the third member selected is the second moment frame beam. The component can currently accommodate in-plane lateral beams (one or two-sided). The component cannot accommodate biaxial or out-of-plane beam configurations at this time.

The first in-plane (lateral beam) selected will use the parameters on the *Beam 1* tab.
The second in-plane (lateral beam) selected will use the parameters on the *Beam 2* tab. This can also be an in-plane cantilever beam.

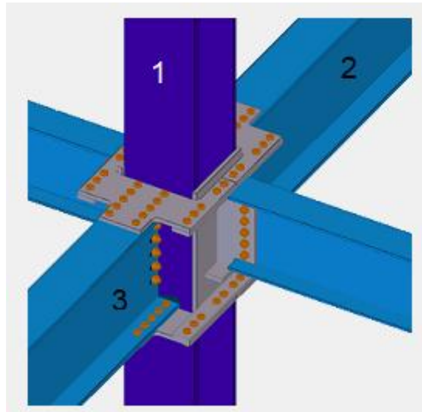


Figure 28. Member Numbering

7.1.2 Connection Elevation

The **Connection elevation** is automatically populated based on the elevation of the selected beam(s). Refer to Section 8.6 for more details on stepped conditions.

NOTE: BEAM AND COMPONENT ELEVATION MUST MATCH FOR COMPONENT TO DISPLAY CORRECTLY.

7.1.3 Column Section Size

The **Column section size** will be auto-populated when a connection is detected.

7.1.4 Connection ID

Connection ID's will be auto-populated from the XML import into the dialog drop down list. The first ID in the XML file to match the column and beam sizes will be applied at a joint and the appropriate connection ID assigned.

7.1.5 Custom ID

When the user needs to add a component manually (refer to Section 4.2), a custom ID can be entered here. This can be especially helpful when the user is initially building a model but does not yet have the custom XML file with all of the exact connection ID's.

NOTE: THIS OPTION IS ONLY AVAILABLE FOR MANUAL APPLICATION OF THE COMPONENT (NO XML IMPORT).

7.1.6 Connection Type

Three different DuraFuse connection types are available:

1. R8, high seismic
2. R3, high wind low seismic
3. R3 Narrow, high wind low seismic for narrow conditions

The XML file contains information about what connection type applies globally to the project (see Figure 29). If the project is R8, the Connection Type will be set to **R8**; if it is an R3 project, it will be set to **R3**, and similarly for **R3 Narrow**.

```xml
<GlobalData>
   <UnitsLength>Inches</UnitsLength>
   <UnitsAngle>Degrees</UnitsAngle>
   <NumberOfCnxns>19</NumberOfCnxns>
   <MemberMtlGrade>A572-50</MemberMtlGrade>
   <BoltGrade>F2280X</BoltGrade>
   <Washer1>0</Washer1>
   <Washer2>0</Washer2>
   <Washer3>1</Washer3>
   <CombinePlates>1</CombinePlates>
   <R8_R3Opt>R8</R8_R3Opt>
</GlobalData>
```

Figure 29. Connection Type XML Parameter

7.1.7 Connection Style

If viable connecting beam(s) are found, the **Connection Style** will have either *One* or *Two-Sided* options available. For two-sided connections, the "near side" beam always determines the elevation.

- For one beam, a one-sided connection type will automatically be assigned (e.g., DF101).
- For two beams with the same elevation, a two-sided connection type will automatically be assigned (e.g., DF201).
- For two beams with differing elevations (step), the connection will not automatically recognize a two-sided connection. The **Beam Elevation Offset** on the *Beam 1* and/or *Beam 2* tabs must be indicated for the beams. Refer to Section 7.2, *Beam 1 Tab* for more information.

7.1.8 Connection Side

Connection side refers to the near or far side beam. Near side beams are those closest to the datum of the model for a particular joint, and vice versa for far-sided beams. The near side beam always determines the elevation of the component. Understanding which beam is the near or far side becomes important when stepped connections apply, but outside of that, if using the DF Tagging tool and XML Import features, this setting can be left alone in the dialog.

See the following rules for determining what side of the column a beam is on:

a. **One-Sided Connections**: the beam can be near or far-sided and the component will automatically determine the elevation of the connection based on the single beam
b. **Two-Sided Connections**: the near sided beam will always be the beam that sets the elevation of the connection.
c. **Two-Sided Connections with Step**: The beam step dimension could be negative or positive, depending on the elevation difference between the near or far side beam. The step dimension will be entered into the far side beam. If the far side beam is higher in elevation than the near side, the step will be a positive number for the far side beam. If the far side beam is lower in elevation than the near side, the step will be a negative number for the far side beam. This offset will be entered on the *Beam 1* or *Beam 2* tabs under **Beam Elevation Offset** input box, see Figure 36. When beam steps apply, and the correct offset has been entered, the option for a Two-Sided Connection will be available and should be selected in the **Connection Type**, see Section 8.6 *Steps* for more information.

7.1.9 Roof Cap Connection

At a top story, the user is provided the option to model a cap plate connection. The options are either **Yes**, to model the cap plate, or **No** to model a typical connection (no cap plate). Refer to Section 8.5 or examples of this connection.

The XML file contains information about whether the connection ID is at a top story condition. If it is a top story condition, the roof cap connection is set to **Yes** upon XML import. If the user prefers to use something other than what is read in from the XML, they can update it on the **Instruction tab** and click **Modify**.

NOTE: EACH TIME THE XML IS IMPORTED, THE ROOF CAP CONNECTION WILL BE RE-SET TO WHAT IS READ IN FROM THE XML FILE.

The user can manually override the roof cap setting in the XML for each connection ID if necessary. Do this by opening the XML file and under <DuraFuseComponent>, <Members> and <IsRoofCap>, change the number to **0 for no** and **1 for yes** (see Figure 30).

```
<DuraFuseComponent>
   <Members>
      <ID>DF101</ID>
      <ColumnSize>W24X94</ColumnSize>
      <TotalNumOfBeams>1</TotalNumOfBeams>
      <WeldHBDefault>0.4375</WeldHBDefault>
      <IsRoofCap>0</IsRoofCap>
```

Figure 30. Roof Cap XML Parameter

7.1.10 Bent External Continuity Plates

For a double sloped connection, it may be beneficial to use a bent external continuity plate, rather than the standard CJP weld for two separate plates. The options are either **Yes**, to model a bent plate, or **No** to model a typical connection (CJP weld). This parameter is read in from the XML but can be changed manually in the XML for each connection ID or in the component on the Instruction tab. Use **0 for no** and **1 for yes** (see Figure 31). Refer to Section 8.8 for examples of this connection.

```
<DuraFuseComponent>
   <Members>
      <ID>DF201</ID>
      <ColumnSize>W24X146</ColumnSize>
      <TotalNumOfBeams>2</TotalNumOfBeams>
      <WeldHBDefault>0.8125</WeldHBDefault>
      <Drag>1</Drag>
      <IsRoofCap>0</IsRoofCap>
      <IsBentExtPlate>0</IsBentExtPlate>
```

Figure 31. Bent External Continuity Plate XML Parameter

7.1.11 Combine Plates to Parts

A detailer may prefer to ship the fuse plate attached to the columns and the top plates attached to the beam (applicable to R8 component only). In this case, the user should select **Yes** for the **Combine Plates to Parts** option (see Figure 27). When the default **No** is selected, the bolts connecting the parts are all field bolts and the plates will be shipped separate from the columns and beams. When **Yes** is selected, the bolts connecting the plates are shop bolts. This is a global parameter read in from the XML, applicable to all connection ID's (see Figure 32). Refer to Section 8.9 for examples of this option.

```
<GlobalData>
   <UnitsLength>Inches</UnitsLength>
   <UnitsAngle>Degrees</UnitsAngle>
   <NumberOfCnxns>19</NumberOfCnxns>
   <MemberMtlGrade>A572-50</MemberMtlGrade>
   <BoltGrade>F2280X</BoltGrade>
   <Washer1>0</Washer1>
   <Washer2>0</Washer2>
   <Washer3>1</Washer3>
   <CombinePlates>1</CombinePlates>
```

Figure 32. Combine Plates to Parts XML Parameter

7.1.12 Drag Condition

When a drag (collector) condition applies to a connection, the top plates may have differing M, P and B bolt parameters than the bottom plates. When a drag condition applies, DuraFuse will provide the differing top plate M, P and B bolt parameters for each applicable connection ID. The XML will read in either **Yes** or **No** for **Drag Condition** (see Figure 34 and Figure 35). When the default **No** applies, the M, P and B bolt top plate parameters will be the same as the bottom plate. When **Yes** applies, the top plate parameters on the Beam 1 and Beam 2 tabs will show up and be populated (see figures below for R8 and R3, respectively). Refer to Section 8.10 for examples of this option.

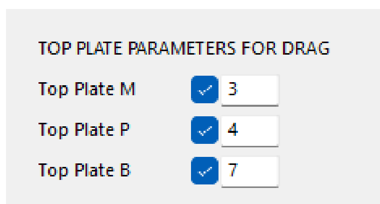


Figure 33. R8 Drag Bolt Parameters for Top Plates

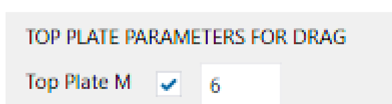


Figure 34. R3 Drag Bolt Parameters for Top Plates

```
<DuraFuseComponent>
   <Members>
      <ID>DF101</ID>
      <ColumnSize>W24X94</ColumnSize>
      <TotalNumOfBeams>1</TotalNumOfBeams>
      <WeldHBDefault>0.5625</WeldHBDefault>
      <Drag>1</Drag>
      <IsRoofCap>0</IsRoofCap>
   </Members>
```

Figure 35. Drag XML Parameter

NOTE: WHILE AVAILABLE, THE DRAG FEATURE FOR THE R3 AND R3 NARROW COMPONENTS IS NOT NECESSARY. CONTACT DURAFUSE FOR MORE INFORMATION.

7.1.13 Connection Placeholder Override

This setting works with the Custom ID for connections placed manually when the project-specific XML file is not yet available. Later, when the XML file is imported, the system will match the Custom ID and update the placeholder with the correct connection data without overriding the Custom ID.

NOTE: THIS OPTION WILL ONLY BE AVAILABLE FOR A CLEAN MODEL (NO XML IMPORT APPLIED).

7.2 BEAM 1 TAB

The *Beam 1* tab dialog contains the input parameters that apply to the first main beam selected. Input parameters in the dialog are auto populated upon running the XML Import tool.

For one-sided connections, the beam parameters will always be populated on the *Beam 1* tab. For a two-sided connection with the same beams, the same properties for Beam 1 will apply to Beam 2. The *Beam 1* tab is, therefore, the primary tab for importing beam properties for two-sided same beam connections.

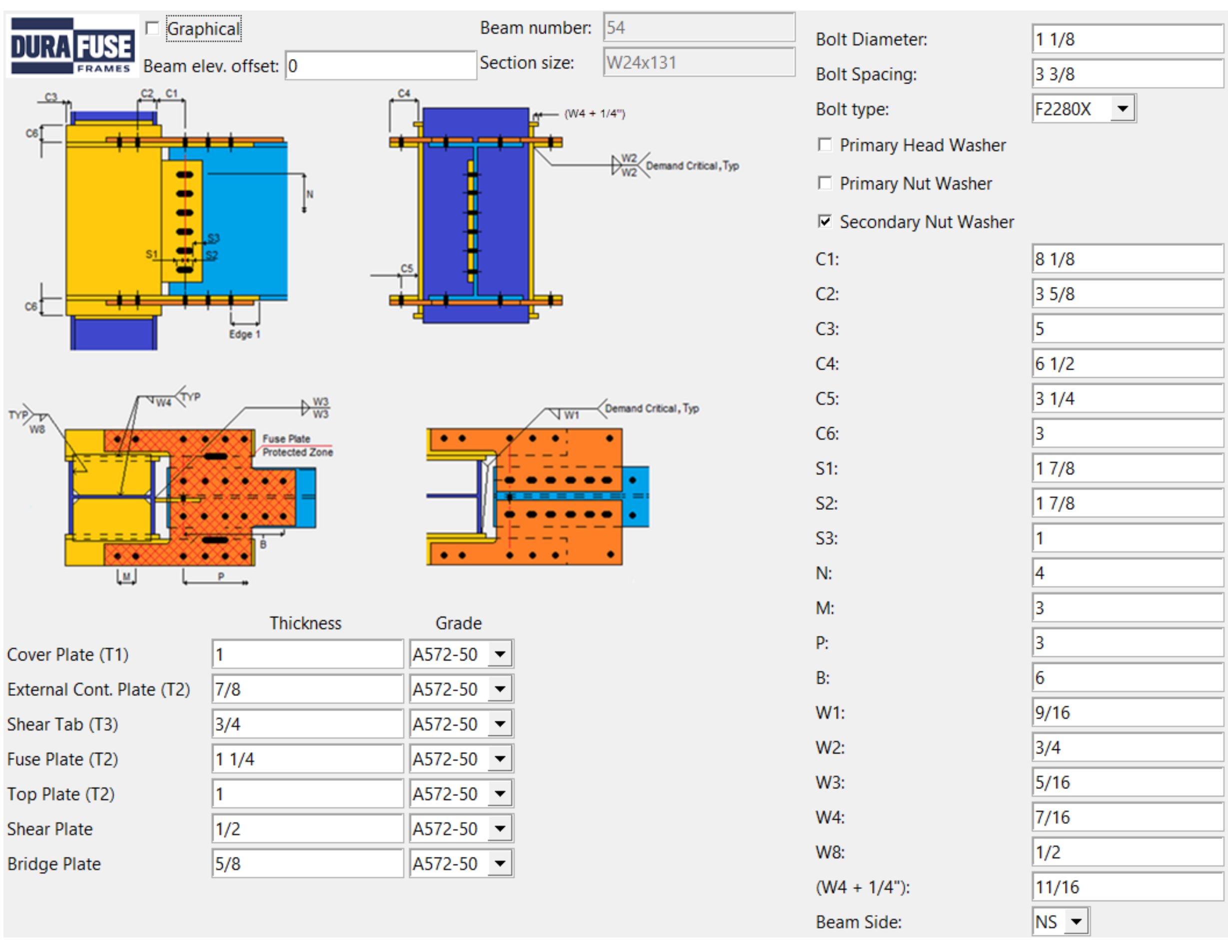


Figure 36. R8 Beam 1 Tab Input Dialog

The Beam 1 tabs for the R3 and R3 Narrow connections are show in Figure 37 and Figure 38, respectively.

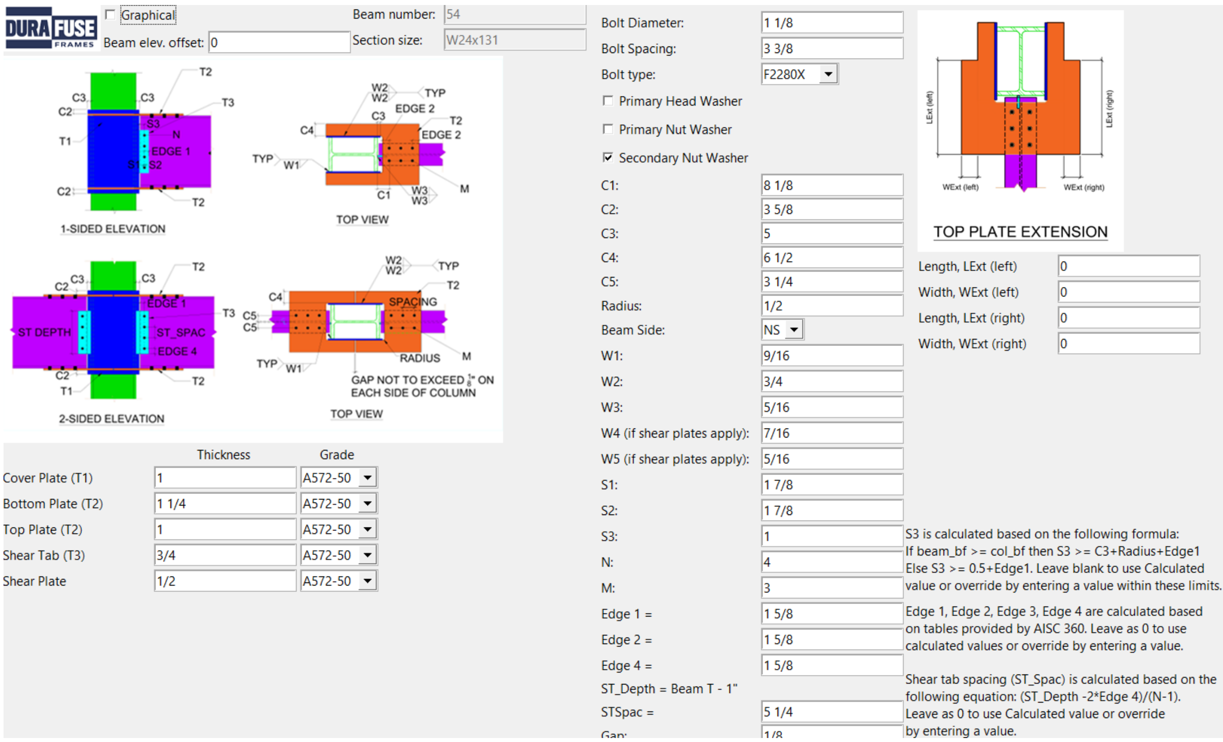


Figure 37. R3 Beam 1 Tab Input Dialog

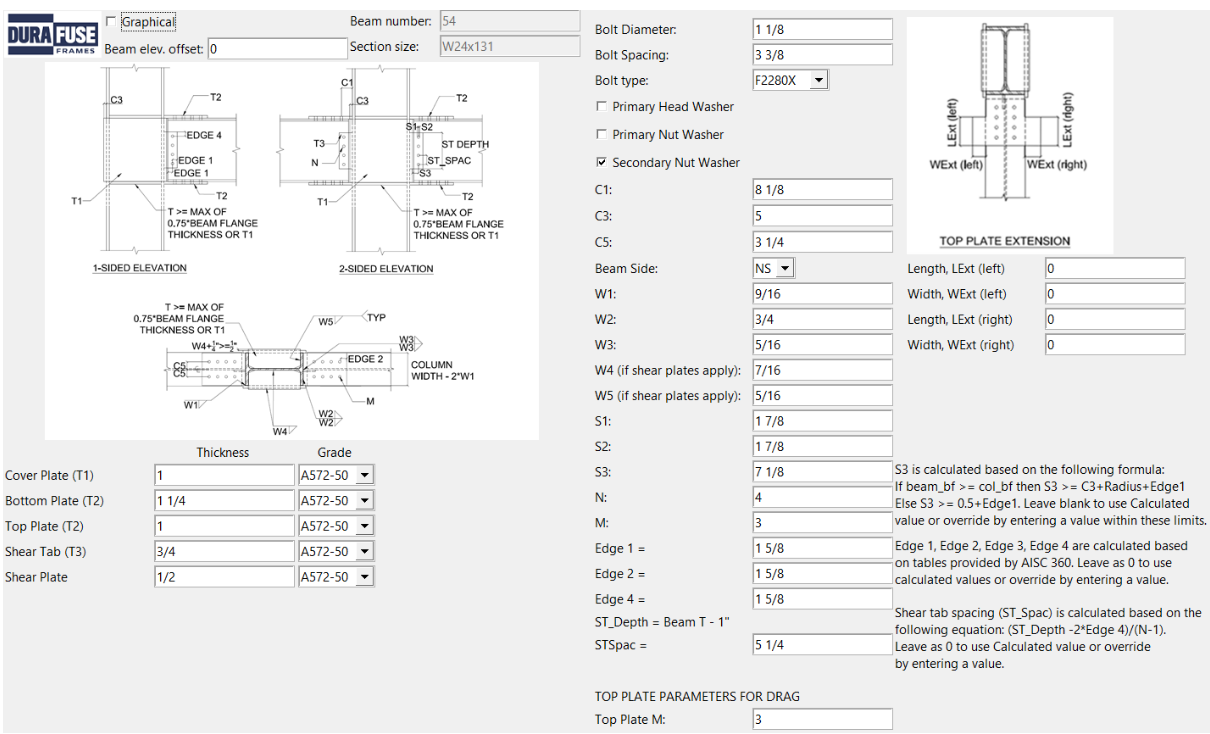


Figure 38. R3 Narrow Beam 1 Tab Input Dialog

Most parameters are imported using the XML Import tool but some parameters are calculated based on imported values. The calculated values are then auto populated in the input boxes. For example, the thickness of the shear and bridge plate is calculated based on the following equations:

Shear Plate Thickness (R8) = Maximum (1.1*W4, 3/8", T1A)
Shear Plate Thickness (R3/R3Narrow) = Maximum (T1A, 0.75*tf_beam)
Bridge Plate Thickness = Minimum (2*W5, T2)

NOTE: BRIDGE PLATES DO NOT APPLY TO THE R3 OR R3 NARROW CONNECTIONS.

Bolt washer information is also included on the Beam 1 (and Beam 2) tabs. The bolt diameter, spacing, grade and washer options are read in from the XML file and are specific to each DuraFuse connection ID. The component default is to include Washer 3 only. The user can modify these washer settings by selecting **Yes** or **No** to include or not include Washers 1, 2 or 3, depending on preference or change the XML (see Figure 39).

NOTE: WHEN THE XML IS IMPORTED, MANUAL MODIFICATIONS MADE TO ANY PARAMETERS WILL BE OVERRIDDEN WITH PARAMETERS FROM THE XML (MANUAL CHANGES WILL BE OVERRIDEN).

```
<GlobalData>
   <UnitsLength>Inches</UnitsLength>
   <UnitsAngle>Degrees</UnitsAngle>
   <NumberOfCnxns>19</NumberOfCnxns>
   <MemberMtlGrade>A572-50</MemberMtlGrade>
   <BoltGrade>F2280X</BoltGrade>
   <Washer1>0</Washer1>
   <Washer2>0</Washer2>
   <Washer3>1</Washer3>
   <CombinePlates>1</CombinePlates>
   <R8_R3Opt>R8</R8_R3Opt>
</GlobalData>
```

Figure 39. Bolt and Washer XML Parameters

7.3 BEAM 1 PLATES TAB

The *Beam 1 Plates* tab (R8 connection only) contains the input parameters for the connection plates for the first lateral beam. These parameters will be auto populated upon XML import.

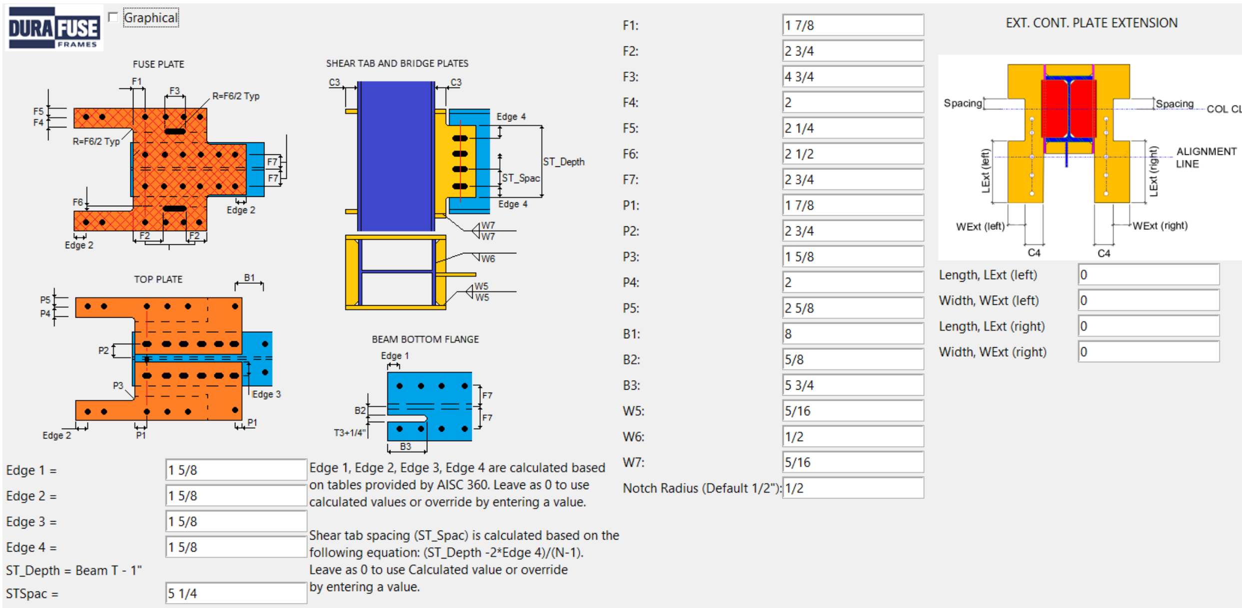
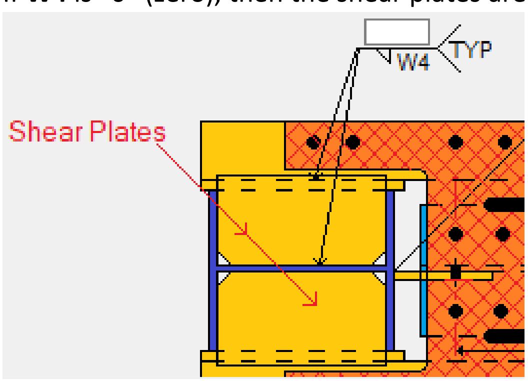


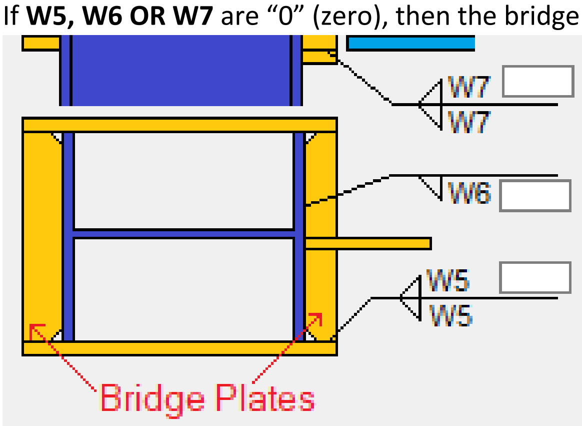
Figure 40. Beam 1 Plate Input Dialog

Some of the plates and welds may or may not apply to a connection depending on the input values. Rules for interpreting when these plates and welds apply are shown below.

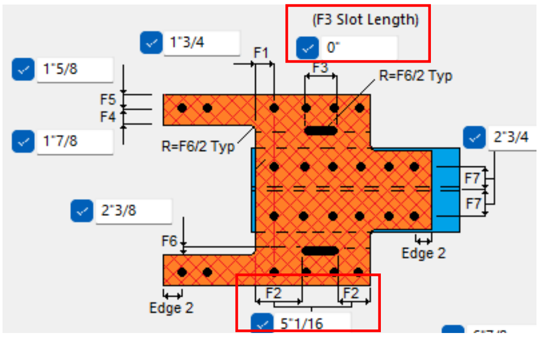
1. If **W4** is “0” (zero), then the shear plates are not created (R8, R3 and R3 Narrow applicable).



2. If **W5, W6 OR W7** are “0” (zero), then the bridge plates are not created (R8 only)

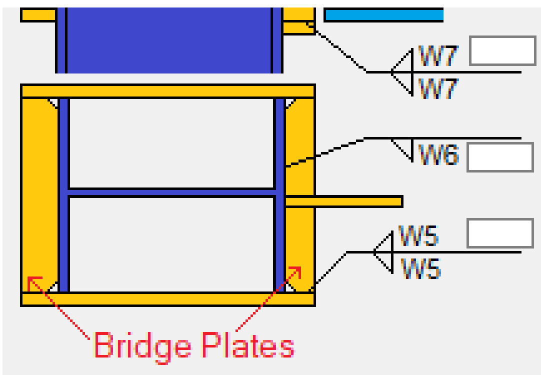


3. If **F3** is "0" (zero), then the fuse hole disappears. F2 has been recalculated in the XML file and auto imported in the dialog (**F2 = F2 + F3/2**). This case applies when *Beam 2* is an in-plane cantilever beam. Be sure to select the beams in such a way that *Beam 2* is the cantilever beam (R8 only).



NOTE: CANTILEVER BEAMS CAN ONLY BE APPLIED TO BEAM 2. BEAM 1 MUST BE A TYPICAL MOMENT FRAME CONNECTION.

4. If **B2 AND B3** are "0" (zero), then the beam slot(s) disappear (R8 only).



7.3.1 Extended External Continuity Plate Option

The **Extension Length** and **Extension Width** fields included on the *Beam 1 Plates* Tab (see *Beam 1 or 2* tabs for the R3 connection) are not auto-populated with the XML file. These fields are a user option to extend the external continuity plates (ECP). This option may be used if the detailer needs extra plate to attach deck or other elements to. Follow the instructions below to use this feature:

1. To extend the left ECP the full length of the plate, enter a length greater than half of the length of the ECP in **LExt (left)**. This will automatically extend the plate the full length of the plate.
2. Enter a desired width of the left side of the plate in **WExt (left)**.
3. To extend the left ECP only part of the length of the plate (see length indicated in Figure 41), enter the length in the **LExt (left)**. This will only extend the plate as shown in the figure.
4. Repeat steps 1-3 for the right ECP, if desired.
5. Follow steps 1-4 for the beam 2 on the *Beam 2 Plates* Tab.

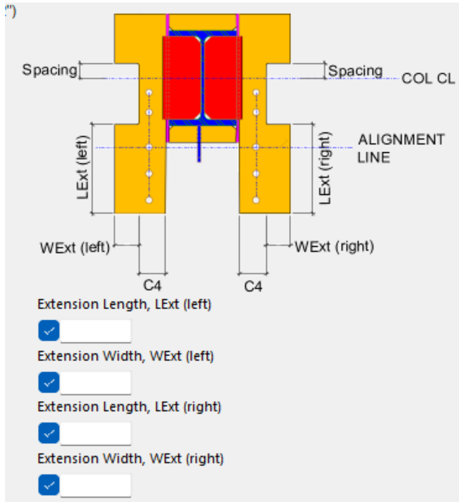


Figure 41. R8 Extended External Continuity Plate Option

The extended plate option also applies to the top plates on the R3 and R3 Narrow components, see figures below for R3 and R3 Narrow, respectively.

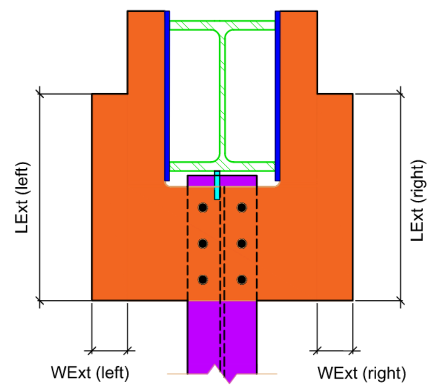


Figure 42. R3 Extended Top Plate Option

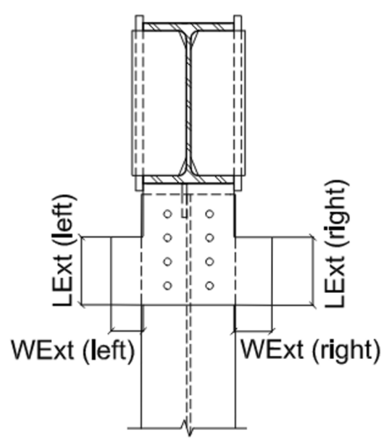


Figure 43. R3 Narrow Extended Top Plate Option

NOTE: THE EXTENDED EXTERNAL CONTINUITY PLATE DOES NOT WORK IN CONJUNCTION WITH THE BENT EXTERNAL CONTINUITY PLATE (DOUBLE SLOPED) CONDITION (R8, R3, R3 NARROW).

NOTE: FOR TWO-SIDED CONNECTIONS, IF THE LENGTH EXTENSIONS ON THE SAME SIDE (LEXT LEFT OR RIGHT) OF BEAMS 1 AND 2 OVERLAP EACH OTHER, THERE WILL BE DETAILING ISSUES WITH THE PLATE. IT IS UP TO THE USER TO SPECIFY LENGTHS APPROPRIATE FOR THE EXTENSION SO THAT THEY DON'T OVERLAP BETWEEN BEAMS 1 & 2.

7.4 BEAM 2 TAB

If a two-sided, same beam connection applies at a joint, the parameters for the first lateral beam will apply to the second lateral beam. Therefore, the inputs on the *Beam 2* tab will match those from the *Beam 1* tab.

If a two-sided different beam connection applies at a joint, only a few of the parameters will differ between the two beams. The parameters that are different between beam 1 and beam 2 are those displayed on the *Beam 2* tab (see Figure 7-44). For example, the shear tab inputs are included on the *Beam 2* tab and these can be different from the *Beam 1* tab inputs.

A two-sided, cantilever condition may also apply. Beam 2 must be selected as the cantilever beam. Parameters applicable to a cantilever connection will be auto imported from the XML and applied appropriately (see Section 8.4 for more information).

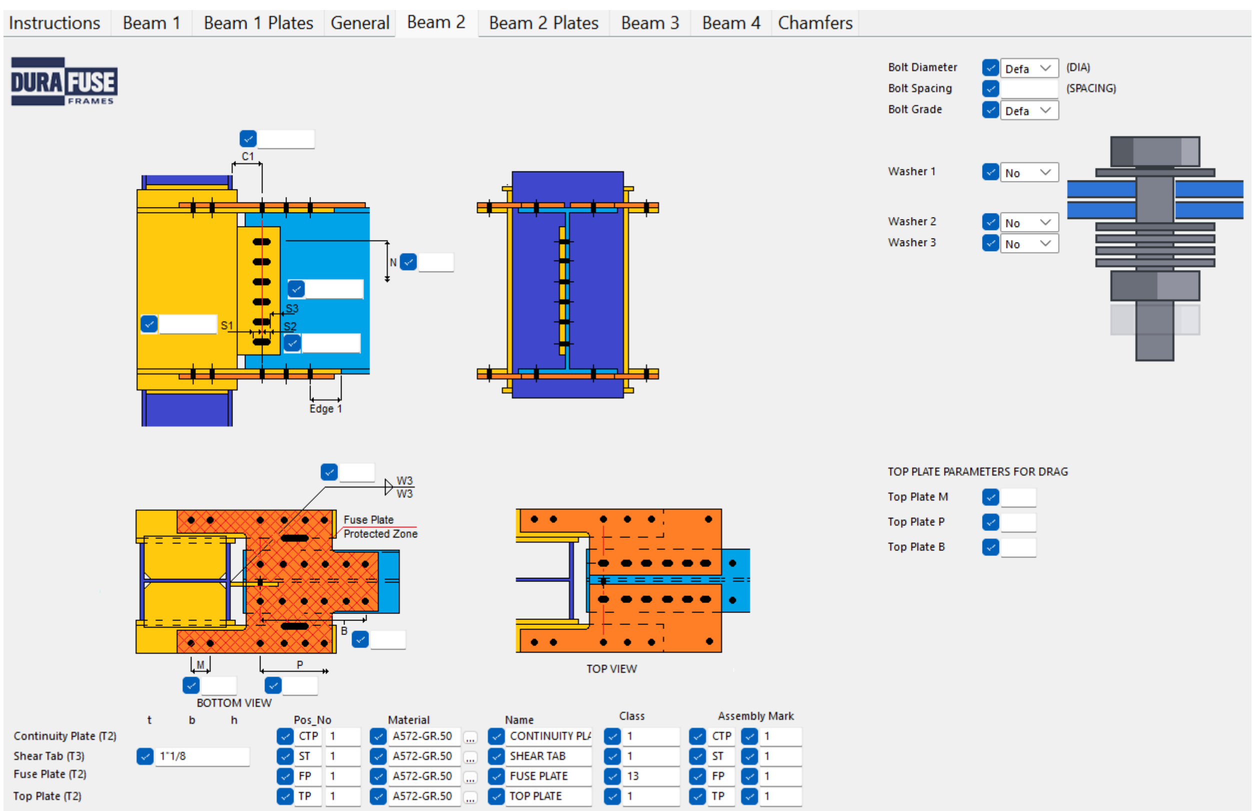


Figure 7-44. Beam 2 Tab Input Dialog

7.5 BEAM 2 PLATES TAB

Similar to the *Beam 2* tab (R8 connection only), if a two-sided, same beam connection applies at a joint, parameters for the first lateral beam plates will apply to the second lateral beam plates. Therefore, inputs on the *Beam 2 Plates* tab will match those from the *Beam 1 Plates* tab.

For a two-sided, different beam connection, inputs on the *Beam 2 Plates* tab are those that differ from the *Beam 1 Plates* tab (see Figure 7-45).

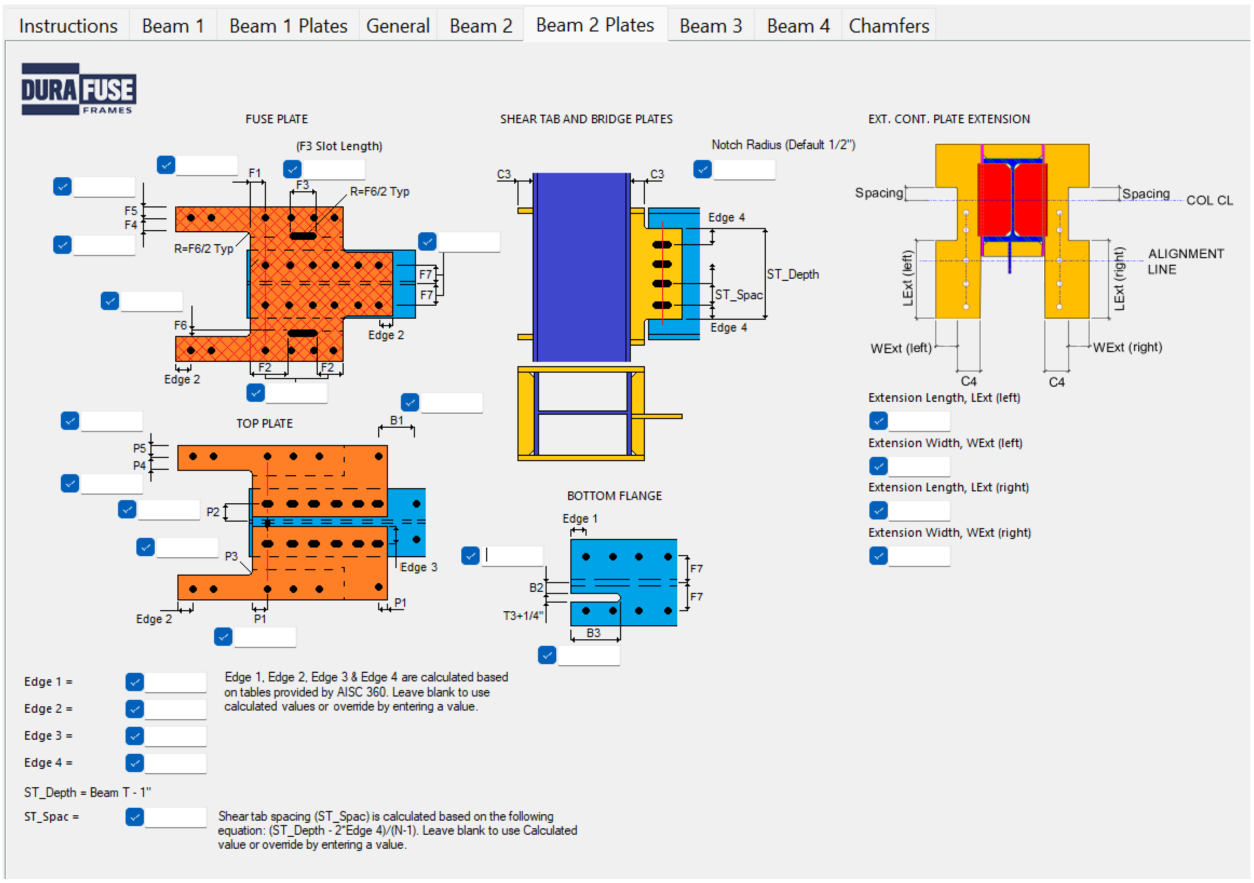


Figure 7-45. Beam 2 Plates Tab Dialog

Refer to Section 7.3.1 for instruction on extending the external continuity plate for Beam 2.

7.6 CHAMFERS TAB

The *Chamfers* tab contains the parameters to control the chamfers on the shear and bridge plates. These parameters are not auto imported with the XML Import tool. However, if they are left blank, the column K and K1 values will be assumed.

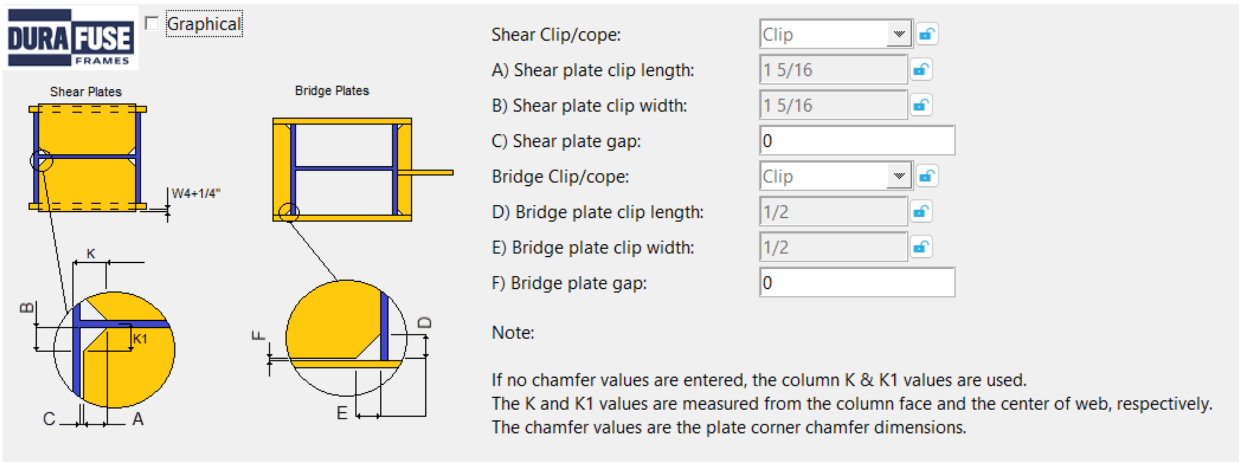


Figure 7-46. Chamfer Tab Input Dialog

The following chamfer rules apply for the **shear plates** used on the lateral beams 1 and 2 (see Figure 7-47):

- If no chamfer values are entered, then the column K & K1 values are used.
- The K & K1 values are measured from the column face and center of web, respectively.
- The chamfer values are the plate corner chamfer dimensions.

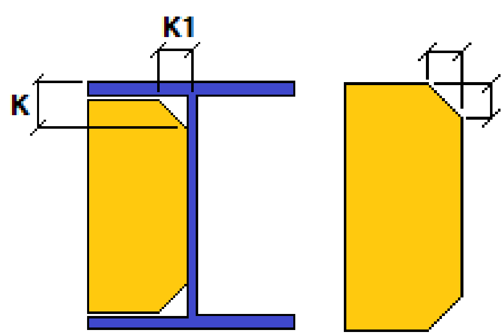


Figure 7-47. Chamfer Details

The following chamfer rule applies for the **bridge plates** used on the lateral beams 1 and 2 (see Figure 7-47):

- For the Bridge Plates, chamfer values are equal for both chamfer dimensions.

7.7 USER OVERRIDES

The bolt edge distance and shear tab spacing can be manually overridden if needed. Any changes made are at the user's discretion.

7.7.1 Bolt Edge Distance Override

Bolt edge distance applies to several locations in the DuraFuse connection such as the shear tab, top plate, fuse plate and beam edge distance (see DFF drawings for where these edge distances apply).

These edge distances are calculated from tables provided in AISC 360, based on the hole type and bolt diameter. The edge distance will be auto-populated based on the bolt diameter.

7.7.2 Shear Tab Bolt Spacing Override

Shear tab bolt spacing, ST1, is calculated based on the length of the shear tab, ST_Len:

ST_Depth = Beam T – 1”

ST1 = (ST_Len – 2*E5)/(N-1)

where, E5 is the edge distance for the shear tab

N = Number of shear tab bolts

The shear tab spacing will be auto-populated based on the previous equations. If the user chooses to use something different than what is provided, it should be close to what is recommended by AISC 360 for bolt spacing.

7.7.3 Shear Plate Thickness Override

When horizontal shear plates apply, the user can override the thickness by changing the thickness on the **Beam 1 tab** and selecting **Modify** (see Figure 48).

NOTE: IF THE XML FILE IS RE-IMPORTED IT WILL SET THE THICKNESS BACK TO ITS ORIGINAL VALUE.

	Thickness	Grade
Cover Plate (T1)	1	A572-50
External Cont. Plate (T2)	7/8	A572-50
Shear Tab (T3)	3/4	A572-50
Fuse Plate (T2)	1 1/4	A572-50
Top Plate (T2)	1	A572-50
Shear Plate	1/2	A572-50
Bridge Plate	5/8	A572-50

Figure 48. Shear Plate Override

To get around the re-setting of the shear plate thickness upon XML import, the shear plate thickness is now recorded in the XML file as **T1A** (only when applicable). The value reported for T1A is a manual DuraFuse override that will apply to all horizontal shear plate thicknesses for the entire project. If the detailer requires different thicknesses for each connection, they can manually update the XML file. To do this, open the XML file, locate each connection by ID, scroll down to <Beam>, then <PlateThickDims>. Locate <T1A> and update the thickness value. Repeat this process for each ID with the desired thickness.

```xml
<Beam>
   <BeamSize>W24X131</BeamSize>
   <BeamNumber>1</BeamNumber>
   <PlateThickDims>
      <T1>1.25</T1>
      <T2>1.25</T2>
      <T3>0.625</T3>
      <T1A>0.5</T1A>
```

Figure 49. Horizontal Shear Plate Thickness Override

8 Specific Information for Included Configurations

The component can accommodate several different configurations including the following:

- One-Sided
- Two-Sided Same Beams
- Cap Plates
- Steps
- Slopes
- Double Slopes
  - Bent Plate Option
  - CJP Option
- Cantilever Beam (R8 Only)
- Combined Plates to Parts (R8 Only)
- Drag Condition (R8 Only)
- Extended External Continuity Plates

See the following sections for details on modelling these specific connections. Not currently included are biaxial connections, combinations of cap plates with steps, or combination of slopes with steps.

8.1 ONE-SIDED

A one-sided connection consists of a single moment frame beam connecting to a column. The figures below show typical examples of a one-sided connection modelled in SDS2 for the R8, R3 and R3 Narrow connection types.

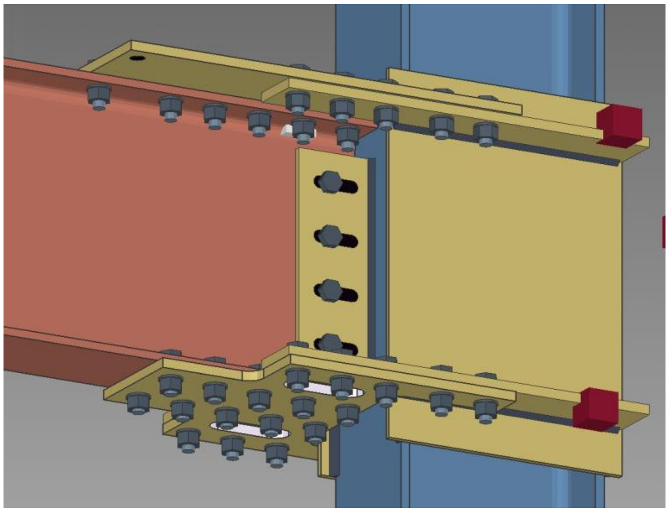


Figure 50. R8 One-Sided Connection

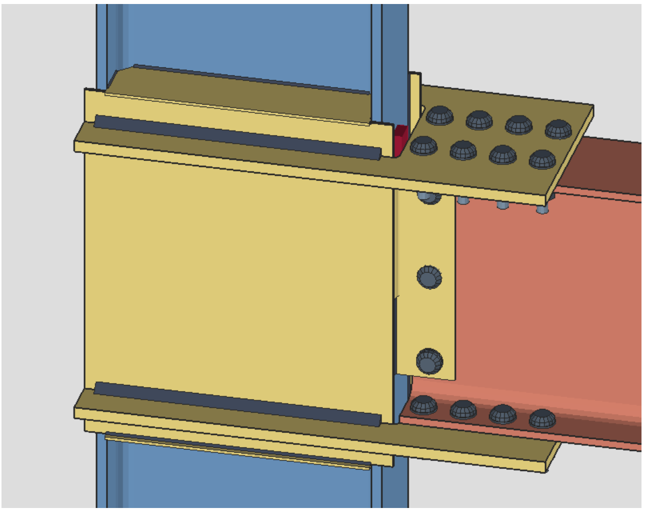


Figure 51. R3 One-Sided Connection

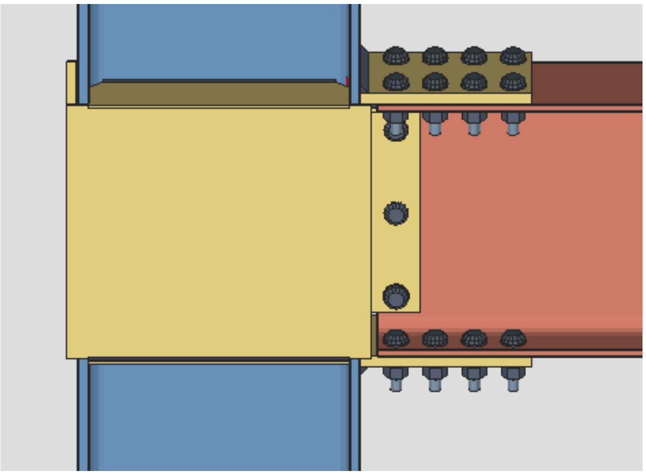


Figure 52. R3 Narrow One-Sided Connection

8.2 TWO-SIDED SAME BEAMS

A two-sided connection includes two moment frame beams of the same size. Typical details of a two-sided same beam connection is shown below for the R8, R3 and R3 Narrow connection types.

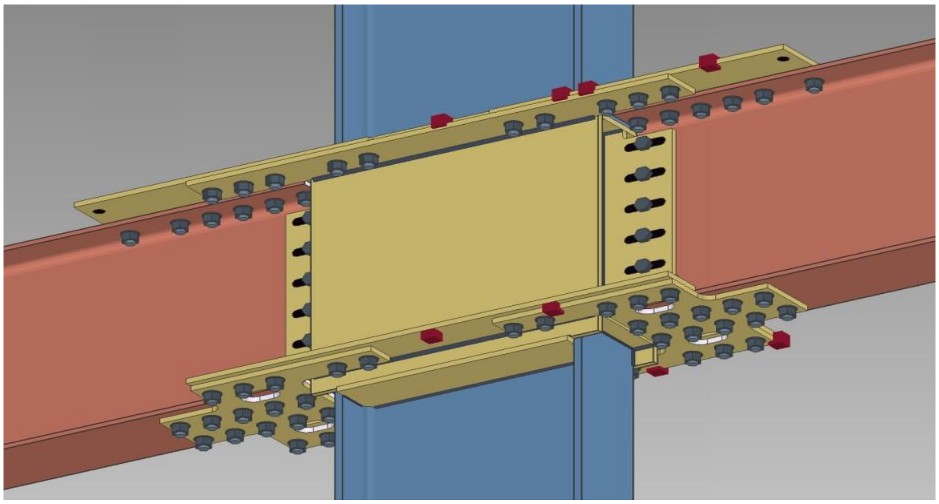


Figure 53. DuraFuse Frames 2-Sided Connection

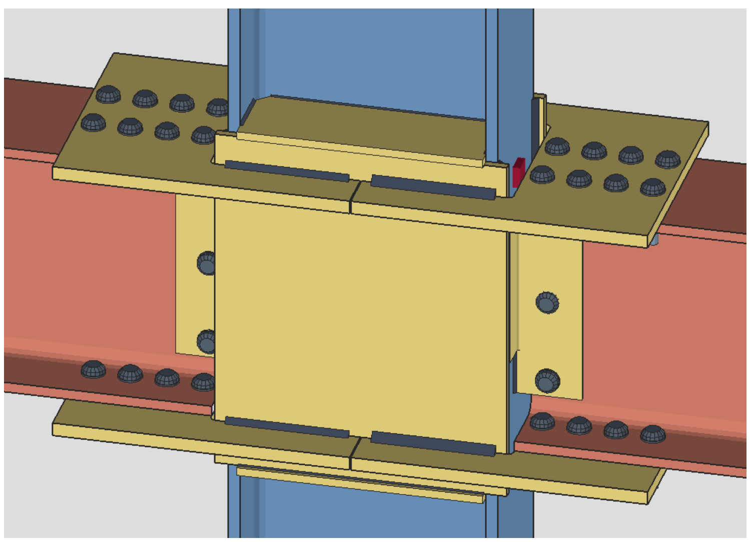


Figure 54. R3 Two-Sided Connection

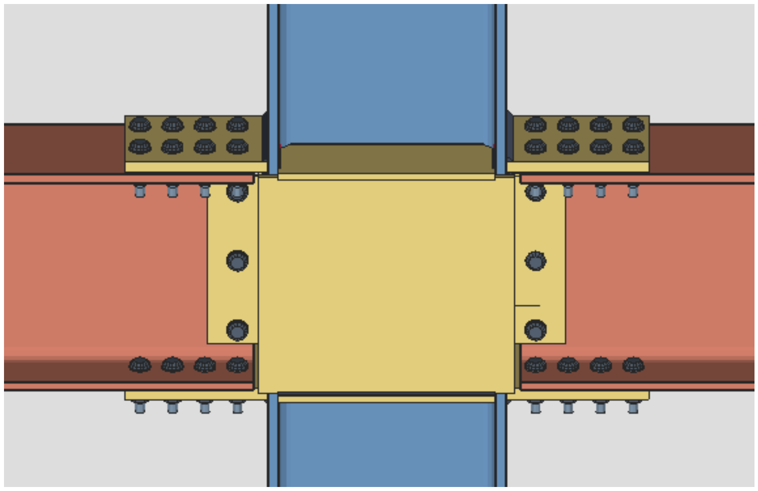


Figure 55. R3 Narrow Two-Sided Connection

For the two-sided connection with same beams, all parameters are the same for Beam 1 and Beam 2, based on the schedules provided by DuraFuse (these parameters are auto-populated using the XML Tool). The parameters that are the same between Beam 1 and 2 and that do not need to be entered for Beam 2 are as follows (these parameters are taken from Beam 1):

- T1 (Cover Plate and Shear Plate Thickness)
- T2 (Top, Fuse, Continuity, and Bridge Plate Thickness)
- C2 Dimension
- C3 Dimension
- C4 Dimension
- C5 Dimension
- C6 Dimension
- W1 (Weld from cover plate to column flange)
- W2 (Weld from continuity plate to cover plate)
- W4 (Weld from shear plate to column web and to cover plate)
- W5 (Weld from bridge plate to cover plate)
- W6 (Weld from bridge plate to column flange)
- W7 (Weld from shear tab to bridge plate)

8.3 TWO-SIDED DIFFERENT BEAMS

A two-sided connection with beams of different size, will have different parameters for the two beams. The connection schedule for this type includes two rows for each beam under the same connection ID, see table below. Each row under the ID will correspond to each beam and will be populated in the *Beam 1* and *Beam 2* tabs.

This type of connection is only valid when the difference in beam depths is greater than or equal to 6”.

Typical details of a two-sided different beam connection is shown below for the R8, R3 and R3 Narrow connection types.

NOTE: BEAM DEPTH DIFFERENCES MUST BE GREATER THAN OR EQUAL TO 6” TO BE APPLIED CORRECTLY IN THE MODEL.

	MEMBER SIZES		PLATE THICKNESS			DIMENSIONS						WELDS							BOLTS PER CONNECTION (EACH SIDE)					
ID	COLUMN	BEAM	T1	T2	T3	C1	C2	C3	C4	C5	C6	W1	W2	W3	W4	W5	W6	W7	DIA	SPACING	M	P	N	B
DF206																								
DF207																								
DF208																								
DF209																								
DF210																								

	MEMBER SIZES		TOP PLATE DIMENSIONS					FUSE PLATE DIMENSIONS							SHEAR TAB			BEAM DIMENSIONS		
ID	COLUMN	BEAM	P1	P2	P3	P4	P5	F1	F2	F3	F4	F5	F6	F7	S1	S2	S3	B1	B2	B3
DF206																				
DF207																				
DF208																				
DF209																				
DF210																				

Table 1. Two-Sided Different Beam Connection Schedules (Blank)

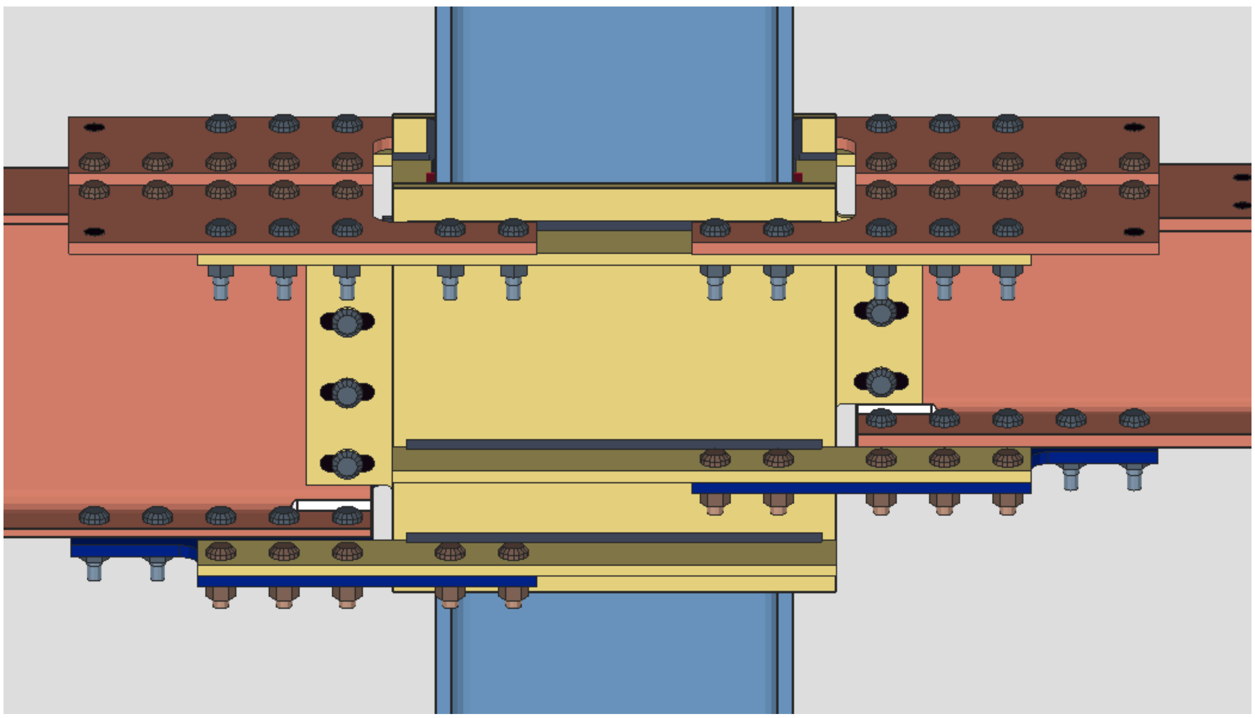


Figure 56. R8 Two-Sided Different Beam Connection

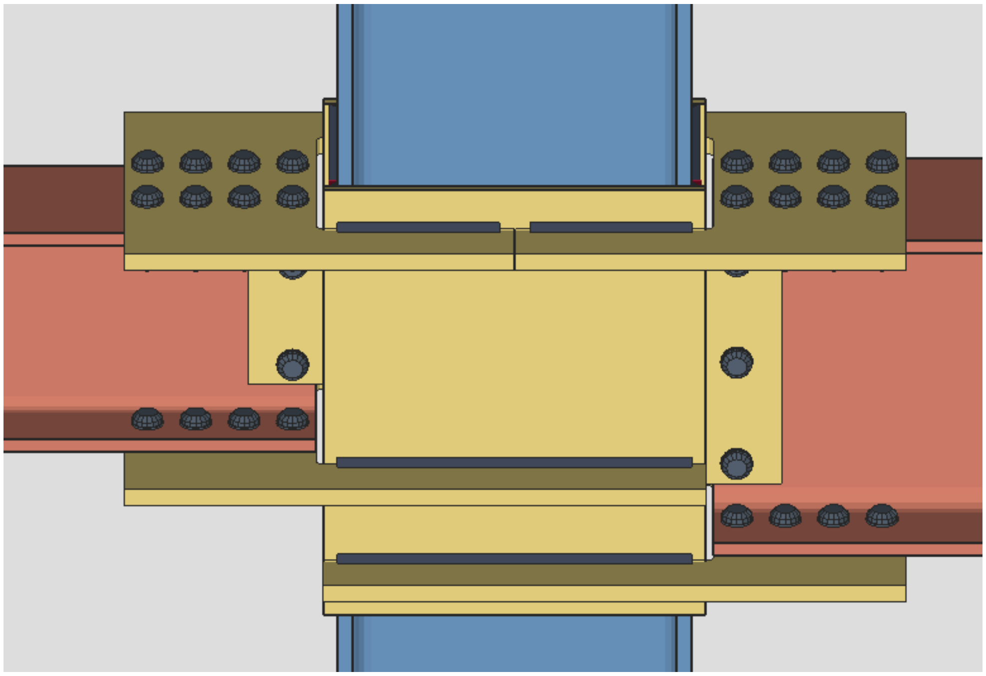


Figure 57. R3 Two-Sided Different Beam Connection

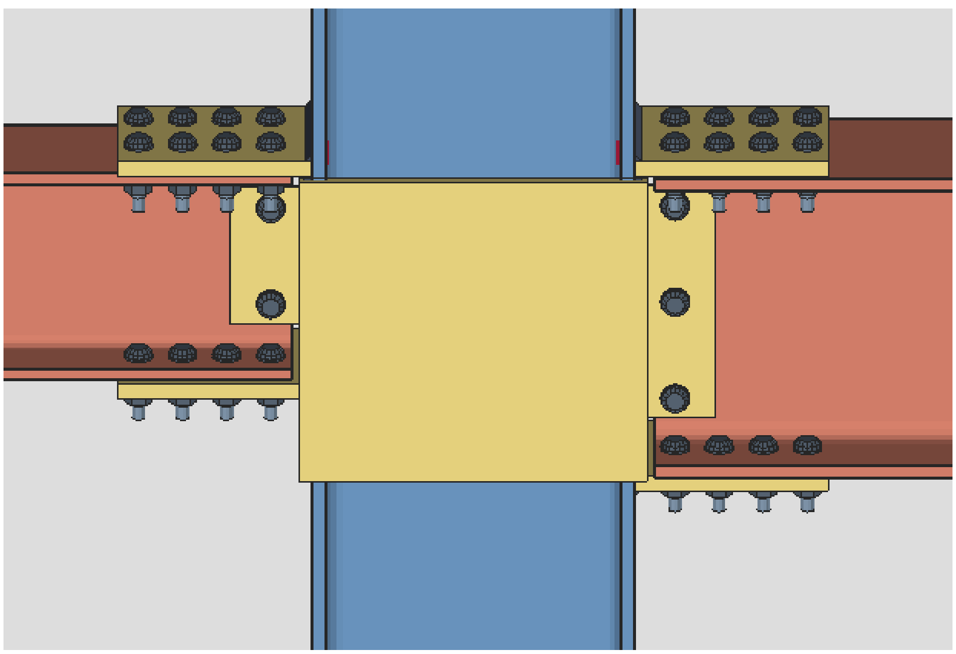


Figure 58. R3 Narrow Two-Sided Different Beam Connection

For the two-sided connection with different beams, most parameters may vary for Beam 1 and Beam 2, based on the schedules provided by DFF. The only parameters that are the same for both beams are as follows (these parameters are taken from Beam 1):

- T1 (Cover Plate and Shear Plate Thickness)
- T2 (Top, Fuse, Continuity, and Bridge Plate Thickness)

- C2 Dimension
- C3 Dimension
- C4 Dimension
- C5 Dimension
- C6 Dimension
- W1 (Weld from cover plate to column flange)
- W2 (Weld from continuity plate to cover plate)
- W4 (Weld from shear plate to column web and to cover plate)
- W5 (Weld from bridge plate to cover plate)
- W6 (Weld from bridge plate to column flange)
- W7 (Weld from shear tab to bridge plate)

8.4 TWO-SIDED CANTILEVER

A two-sided connection where one beam is a cantilever beam (*Beam 2*), will have different parameters for F3 and F2 between the two beams (R8 connection only). The connection schedule for this type will include an asterisk, indicating a cantilever connection (see image below).

DF201
DF202*
DF203
DF204
DF205
DF206*

The asterisk correlates with the note in the schedule, giving instruction for the cantilever beam (*Beam 2*):

*** THERE ARE NO FUSE HOLES ON THE FUSE PLATE FOR THE CANTILEVER SIDE OF THE CONNECTION. STANDARD BOLT HOLES MUST BE USED ON TOP PLATES AND FUSE PLATES ON THE CANTILEVER SIDE.**

A typical detail of a two-sided cantilever connection is shown below. Note that one side of the connection has the fuse holes (*Beam 1*) and the other does not. The side without the fuse holes is the cantilever side (*Beam 2*). F3 = 0 in the component and is auto-populated from the XML file if the cantilever beam is known in advance. Refer to Section 7.3 for more details on input parameters. If the user manually needs to create a cantilever beam, only *Beam 2* can be the cantilever beam so be sure to indicate *Beam 1* and *Beam 2* correctly when applying the connection. The component will also update the bolt holes for the cantilever beam to use standard holes instead of the typical oversized holes.

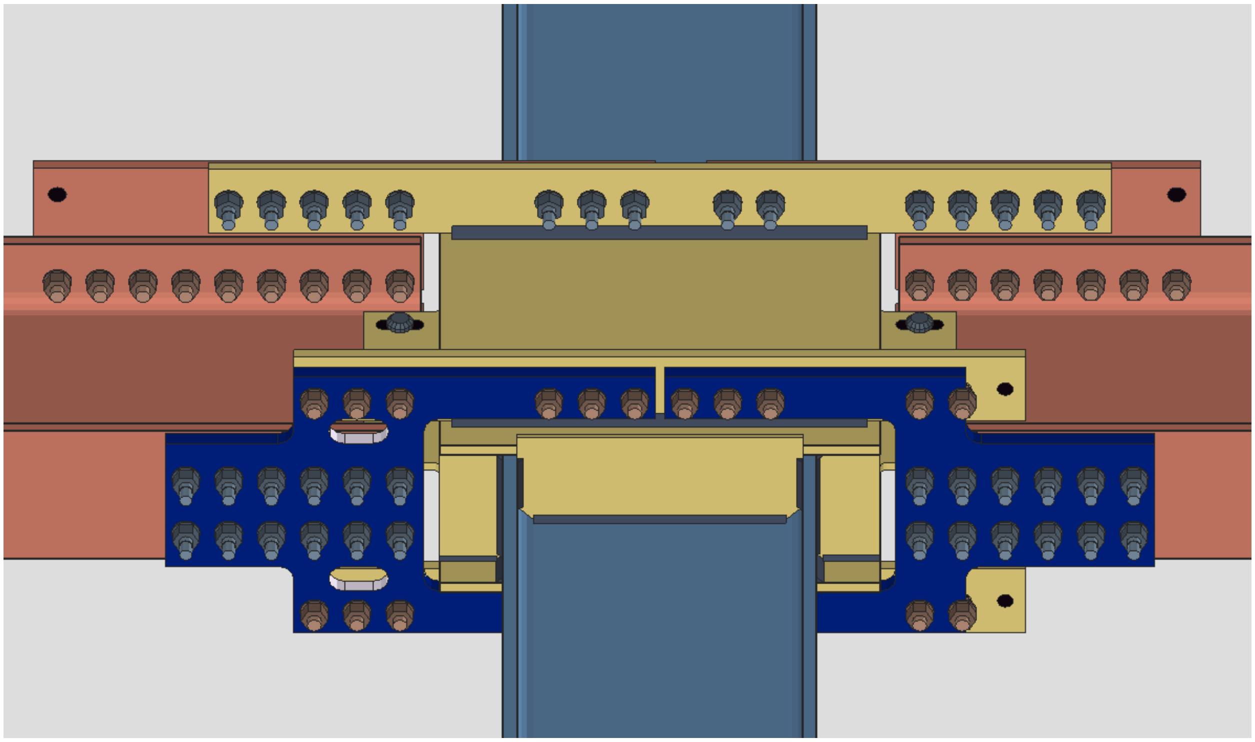


Figure 59. Two-Sided Cantilever Connection

8.5 CAP PLATES

A cap plate option is available for connections at the top of a frame. The **Roof Cap Connection** option can be selected on the *Instructions* tab in the Component Dialog, see Figure 26. Instead of having separate shear and external continuity plates, the cap plate replaces those with a single plate, see the figures below for typical cap plate connections for R8, R3 and R3 Narrow.

NOTE 1: IF THE TOP OF COLUMN ELEVATION IS TALLER THAN THE BEAM ELEVATION, THE COLUMN WILL BE CUT TO THE CORRECT ELEVATION WHEN THE CAP PLATE IS APPLIED. IF THE COLUMN IS SHORTER THAN THE BEAM ELEVATION, THE COMPONENT WILL NOT DISPLAY CORRECTLY. MAKE SURE TO EXTEND THE COLUMN TO THE CORRECT HEIGHT TO AVOID THIS ISSUE.

NOTE 2: THE CAP PLATE OPTION DOES NOT APPLY AT DOUBLE SLOPED CONNECTIONS. THEREFORE, THE BENT EXTERNAL CONTINUITY PLATE OPTION (ONLY APPLICABLE TO DOUBLED SLOPED CONNECTIONS) WILL BE GREYED OUT WHEN CAP PLATE CONNECTIONS APPLY.

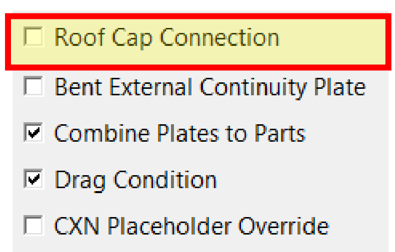


Figure 60. Cap Plate Option

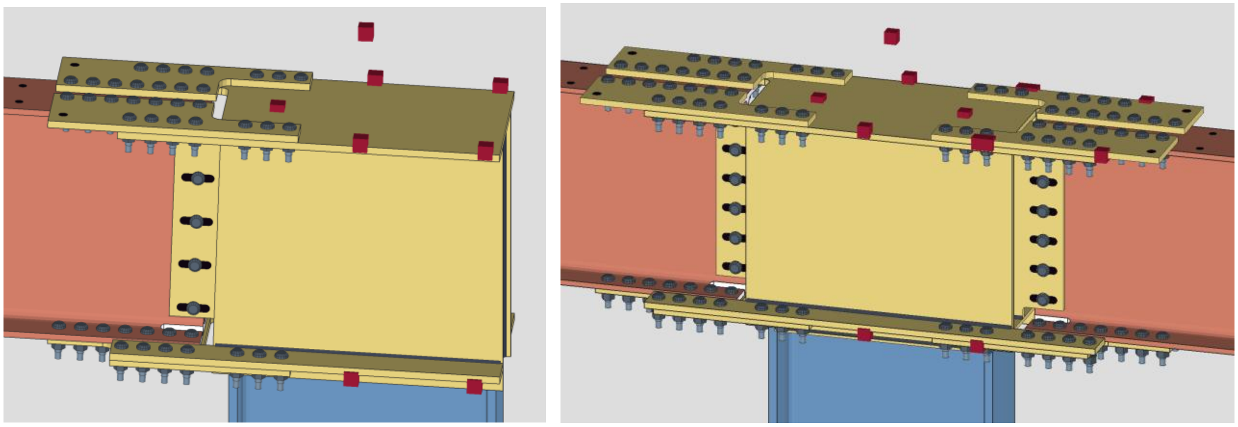


Figure 61. R8 Cap Plate Connection

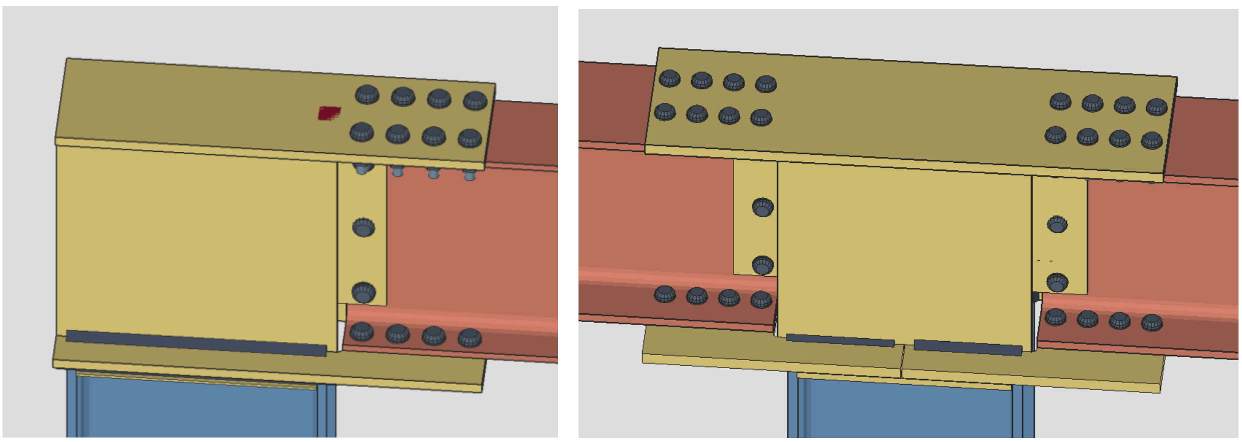


Figure 62. R3 Cap Plate Connection

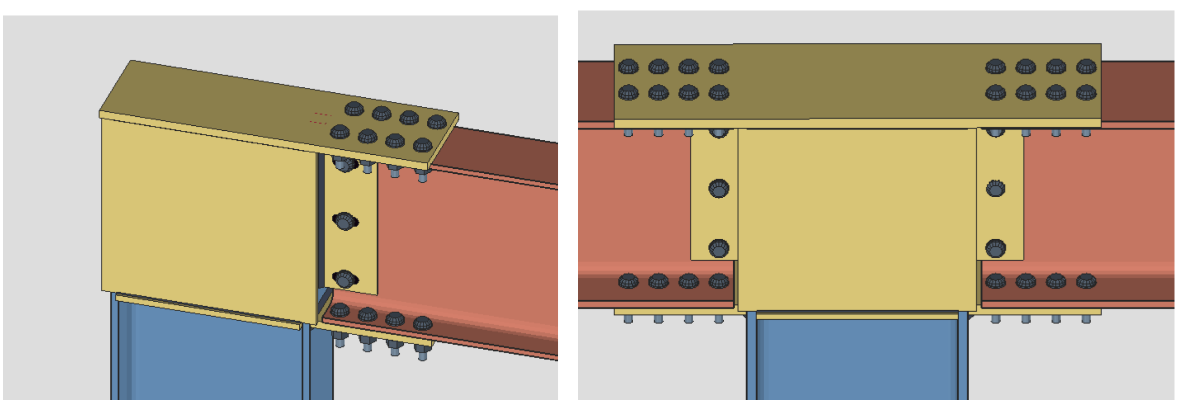


Figure 63. R3 Narrow Cap Plate Connection

8.6 STEPS

Beams may be offset from each other by a minimum of 6”. See the figures below for typical stepped connections for R8, R3 and R3 Narrow connection types. The near side beam will establish the elevation of the component. The offset should be entered on the far side **Beam Elevation Offset** on the *Beam 1* or *Beam 2* tab in the component dialog.

NOTE 1: ANY STEP LESS THAN 6" COULD CAUSE BOLT CONFLICT. IF STEPS ARE LESS THAN 6", THE EXTERNAL CONTINUITY PLATES WILL NOT BE SPLIT AND THE CONNECTION MAY HAVE ERRORS.

NOTE 2: STEPPED CONDITIONS WILL NOT BE DETECTED AND APPLIED BY THE DFF TAGGING TOOL (SEE SECTION 7.1.8). THESE TYPES OF CONDITIONS WILL NEED TO BE APPLIED MANUALLY USING PROCEDURES OUTLINED IN SECTION 4.2.

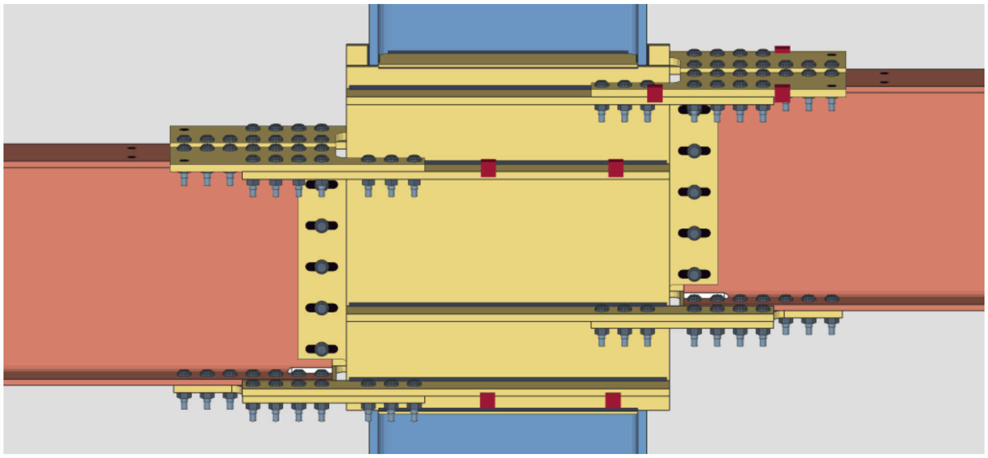


Figure 64. R8 Beam Step Connection

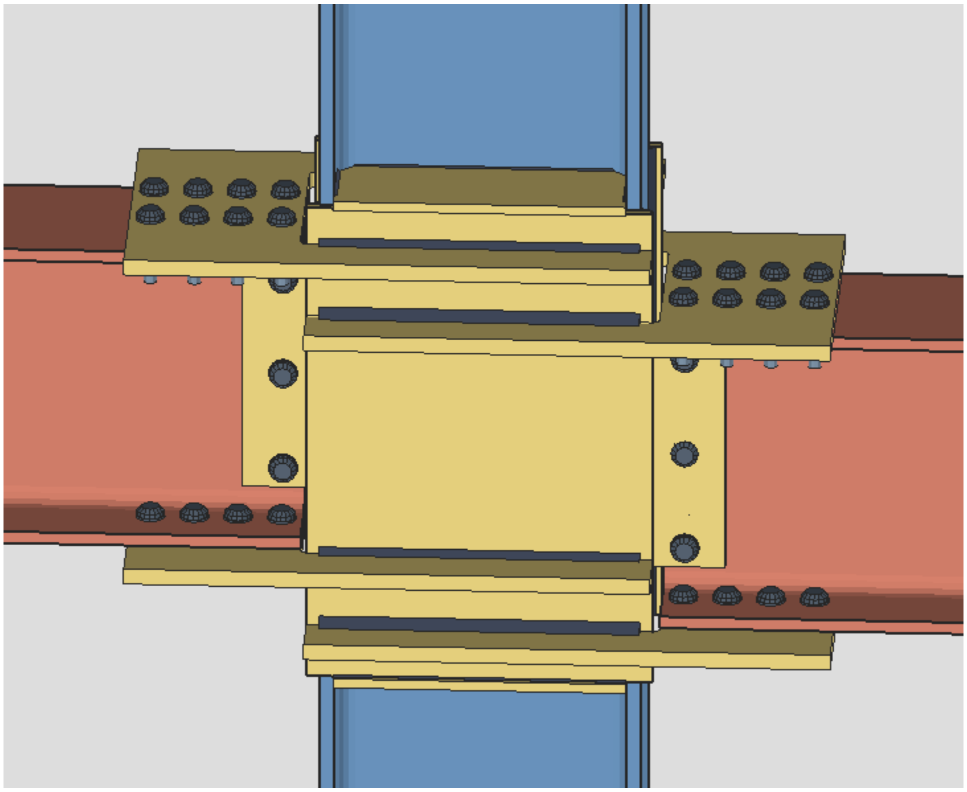


Figure 65. R3 Beam Step Connection

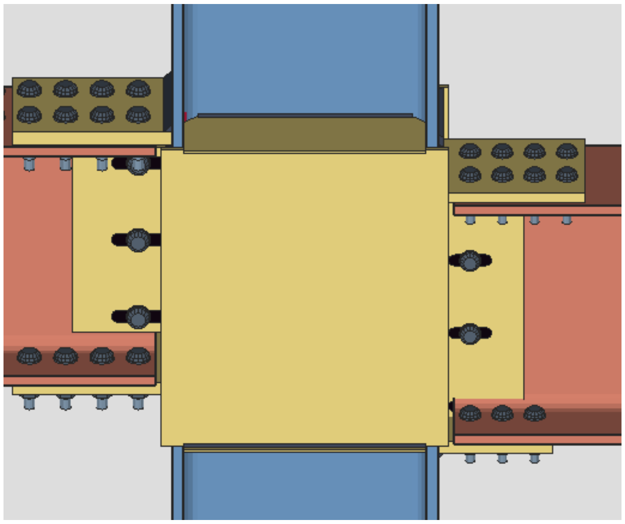


Figure 66. R3 Narrow Beam Step Connection

8.7 SLOPES

Slopes apply to one-sided and two-sided connections. See figures below for typical sloped connections.

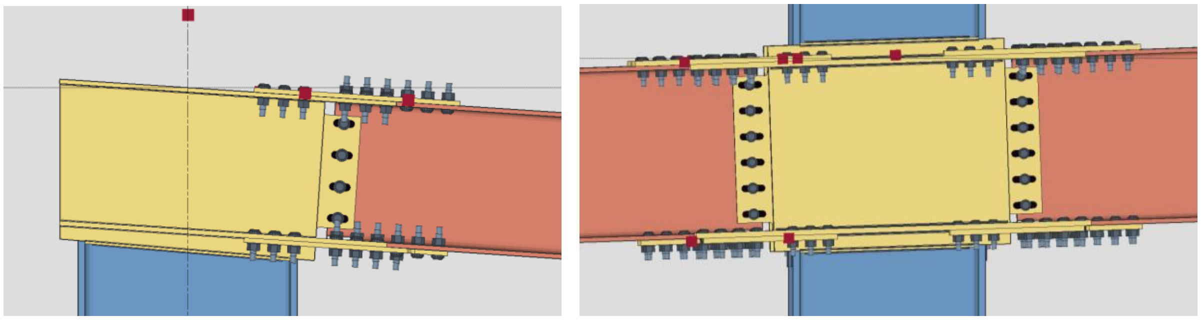


Figure 67. R8 Sloped Connections

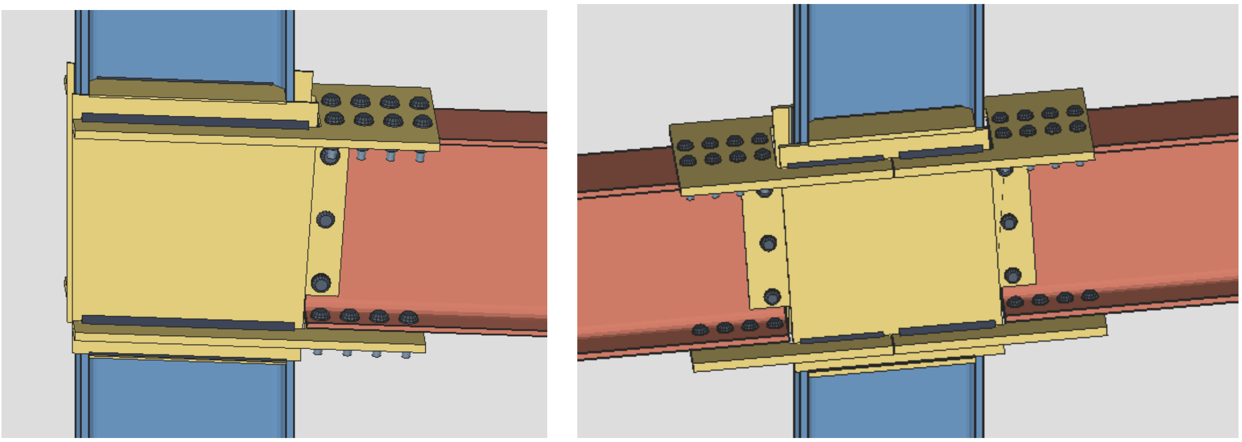


Figure 68. R3 Sloped Connections

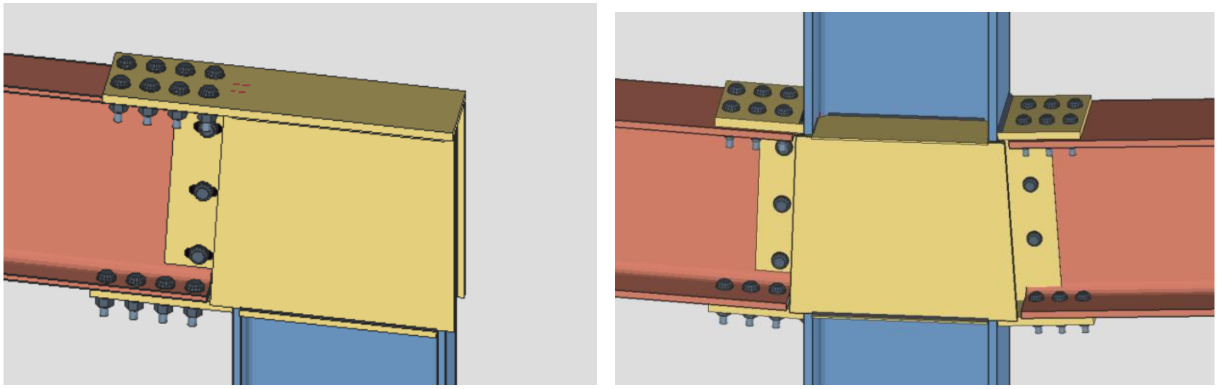


Figure 69. R3 Narrow Sloped Connections

8.8 DOUBLE SLOPES

Double sloped connections apply for two-sided connections. Two options for the external continuity plates are available for double slopes for the R8 connection type: 1) bent plate and 2) CJP weld. These options can be specified with the **Bent External Continuity Plate** option on the *Instructions* tab of the Component Dialog, see Figure 70. If it is not selected, the CJP option will apply. See figures below for various examples of sloped conditions with bent plates or CJP options.

For double sloped connections, Weld 2 is shown in the model as two separate welds, with a break where the external continuity plates meet. While Weld 2 is shown with a break, it shall be detailed as a continuous weld in the drawings. A note has been added for this case and can be displayed when the column assembly drawings are created (see Figure 73). The note reads “See Holdback Detail. Weld shall be continuous between sloped segments.”

The CJP weld may not consistently show up in the model. However, it is consistently called out in the drawings.

NOTE: THE CAP PLATE OPTION DOES NOT APPLY TO DOUBLE SLOPED CONNECTIONS. IF A CAP PLATE CONNECTION IS APPLIED TO A DOUBLE SLOPED CONNECTION, THE CAP PLATE WILL MAY BE IGNORED AND MAY BE DRAWN INCORRECTLY.

COMBINATION DOUBLE SLOPED, EXTENDED EXTERNAL CONTINUITY PLATES, AND STEPPED CONDITIONS ARE NOT AVAILABLE IN THE DFF COMPONENT. THEY WILL NEED TO BE DRAWN MANUALLY.

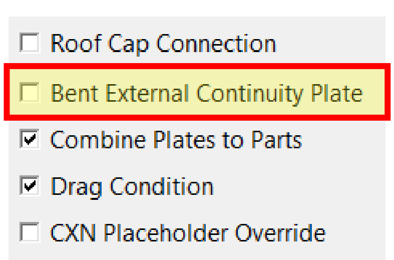


Figure 70. Bent External Continuity Plate Option

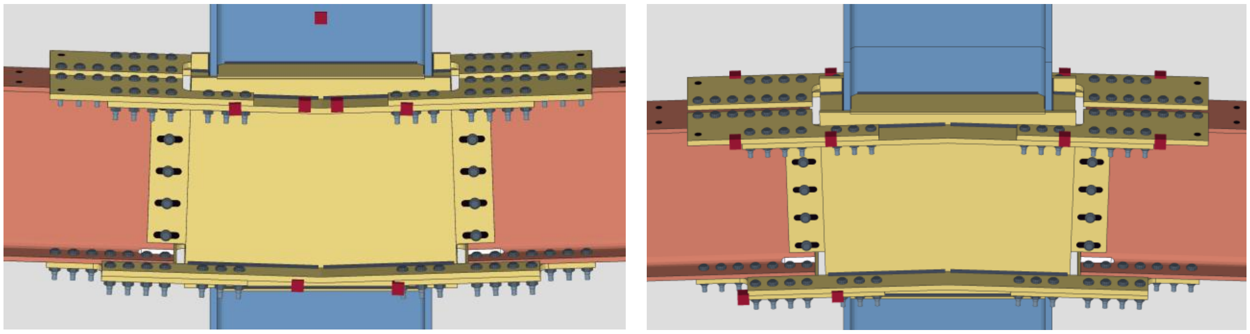


Figure 71. R8 Double Sloped - Bent External Continuity Plate Option

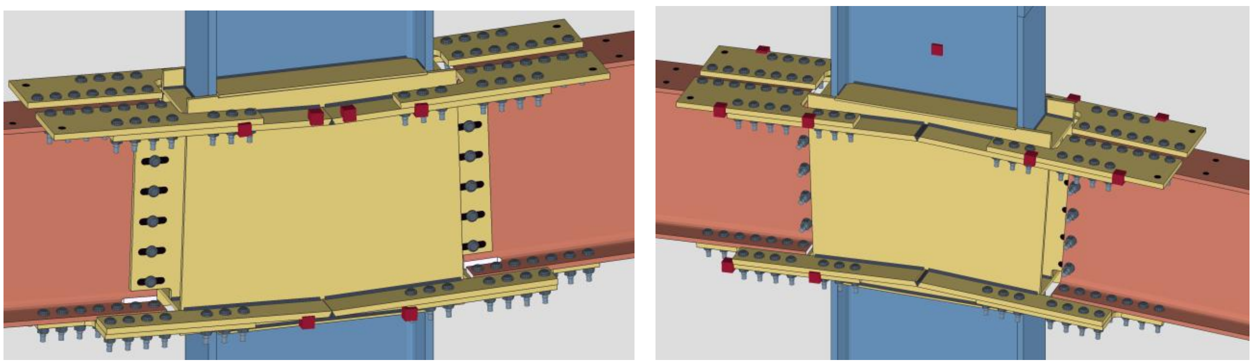


Figure 72. R8 Double Sloped - CJP External Continuity Plate Option

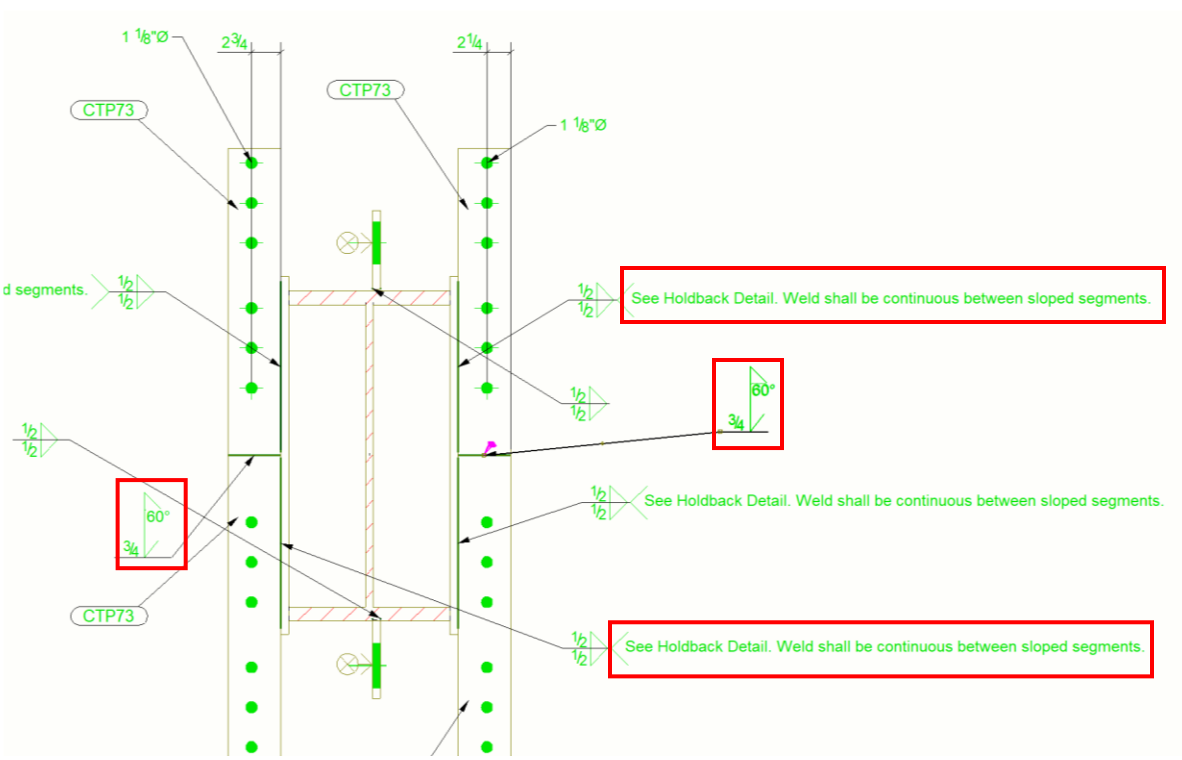


Figure 73. Weld 2 Note and CJP Callout in Drawing Template

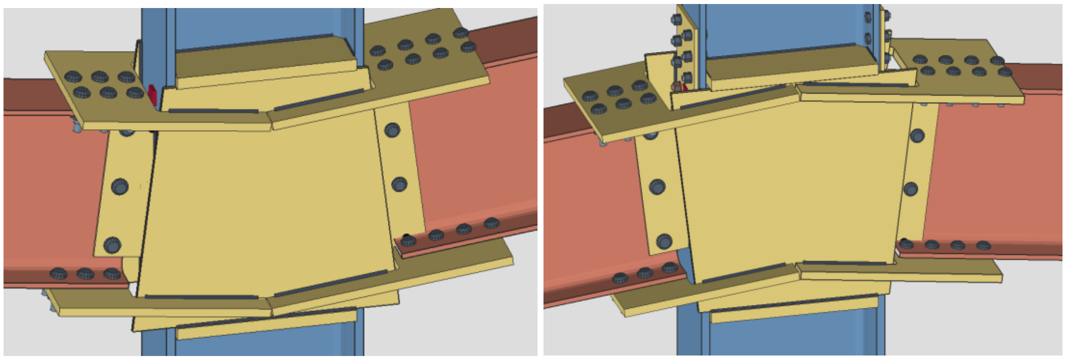


Figure 74. R3 Double Sloped Connection

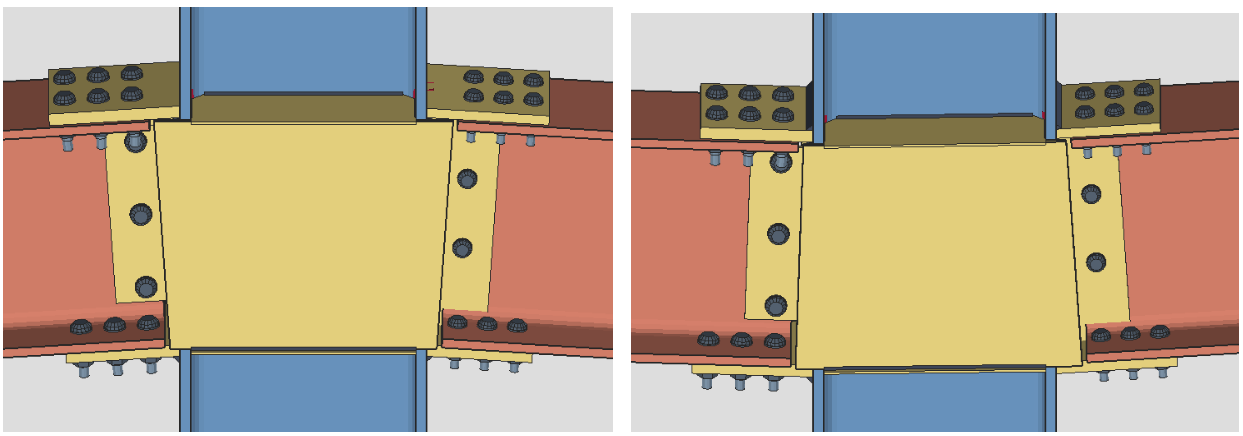
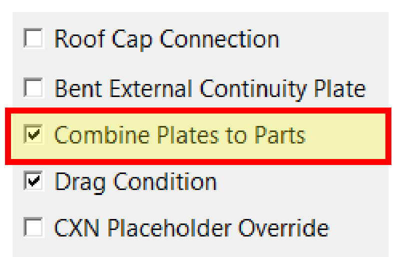


Figure 75. R3 Narrow Double Sloped Connection

8.9 COMBINE PLATES TO PARTS

When the user selects **Yes** to combine plates to parts (see Section 7.1.11), the two different types of bolts, shop (brown) and field (grey), will be shown in the SDS2 model (see Figure 76). Otherwise, all of the bolts will be shown as field (yellow) bolts. This feature applies to the R8 connection ONLY.



Field Bolts

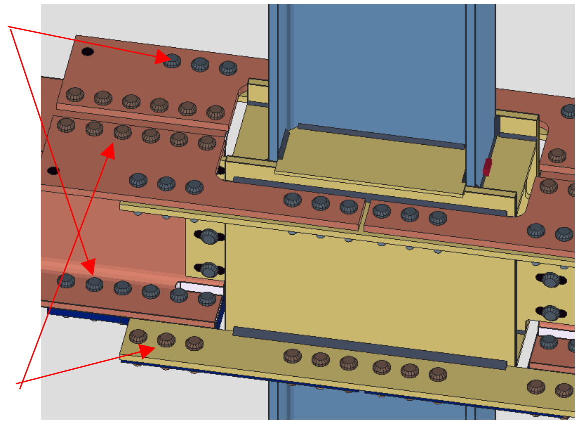


Figure 76. R8 Field (grey) and Shop (brown) Bolts for Combined Plates Option

8.10 DRAG CONDITION

When the user selects Yes to include a Drag Condition, (see Section 7.1.12), the number of M, P and B bolts on the top plates can differ from those on the bottom plates. The user enters in the appropriate M, P and B bolts for the top plates. For example, 3 M bolts, 5 P bolts and 9 B bolts have been specified for the top plates for beam 1 in the connection shown below. The bottom plates still have the original 3 M, 3 P and 6 B bolts. For beam 2, the top plates have 7 B bolts and the bottom plates only 6.

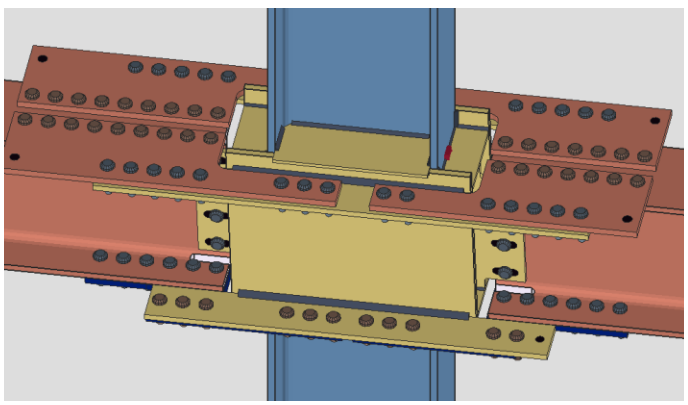


Figure 77. R8 Drag Condition with Differing Bolt Counts for Top Vs. Bottom Plates.

8.11 EXTENDED EXTERNAL CONTINUITY PLATES

The user may add extensions to either the external continuity plates (for R8) or the top plates (for R3 and R3 Narrow), see Sections 7.3.1. Examples of these extensions for the different components are shown in the following three figures. This feature may be applied in conjunction with slopes and drag conditions.

NOTE 1: THE EXTENDED EXTERNAL CONTINUITY PLATE DOES NOT WORK IN CONJUNCTION WITH THE BENT EXTERNAL CONTINUITY PLATE (DOUBLE SLOPED) CONDITION (R8, R3, R3 NARROW).

NOTE 2: FOR TWO-SIDED CONNECTIONS, IF THE LENGTH EXTENSIONS ON THE SAME SIDE (LEXT LEFT OR RIGHT) OF BEAMS 1 AND 2 OVERLAP EACH OTHER, THERE WILL BE DETAILING ISSUES WITH THE

PLATE. IT IS UP TO THE USER TO SPECIFY LENGTHS APPROPRIATE FOR THE EXTENSION SO THAT THEY DON'T OVERLAP BETWEEN BEAMS 1 & 2.

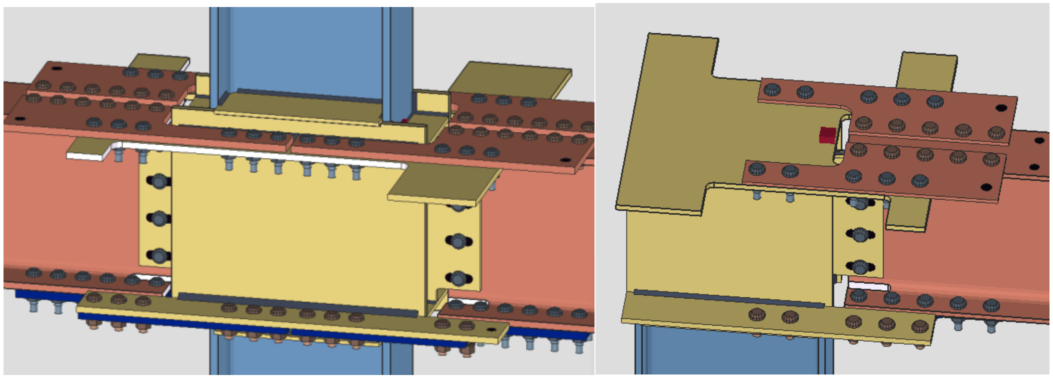


Figure 78. R8 Extended Top External Continuity Plates (lower and roof conditions)

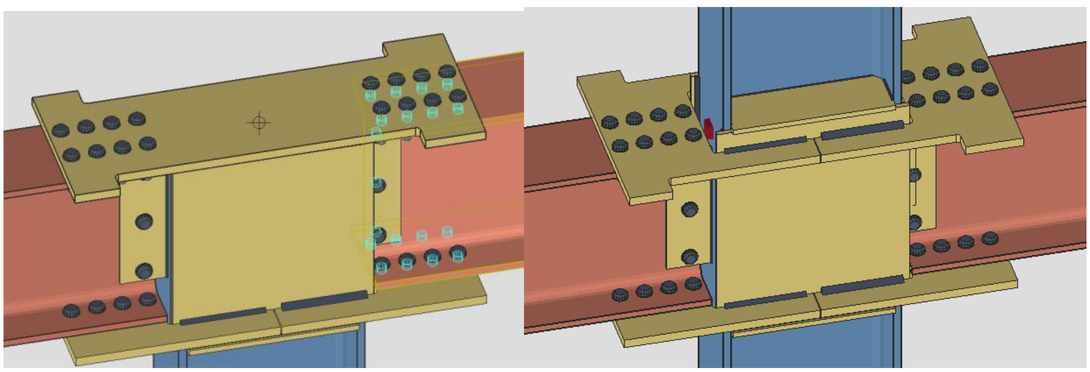


Figure 79. R3 Extended Top Plates (lower and roof conditions)

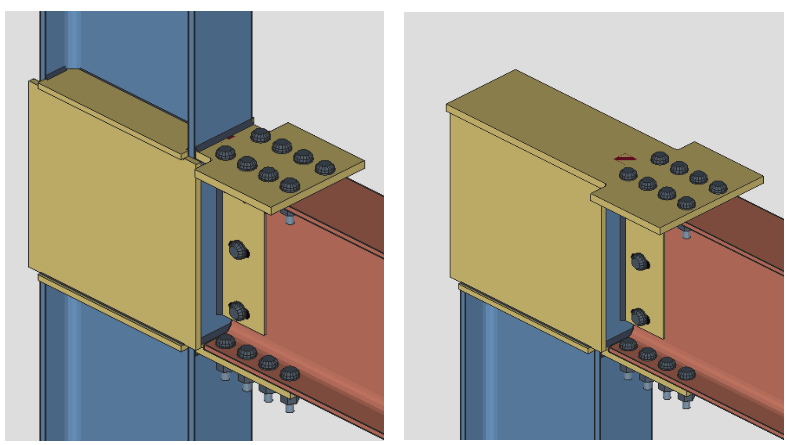


Figure 80. R3 Narrow Extended Top Plates (lower and roof conditions)