Tips & Tricks in Revit Structure - Creating Custom 2D Drafting Details

Betsy Werra

E.L.Werra Consulting, LLC
Creating Custom 2D Drafting Details

Learning Objectives:

- Understand the depth and complexity of 2D detail components and how they apply in Revit.
- Identify when to use 2D detail components instead of detail lines/filled regions.
- Layout the process for creating 2D detail components using Revit templates and existing 2D components.
Creating Custom 2D Drafting Details

2D Detail Component Families with Text Labels

- Center Line & Grid 2D component family
- Slope 2D Component family
- Section Cut 2D families
Creating Custom 2D Drafting Details

Using Existing 2D Detail Components & Linework

- Editing the existing “AISC Wide Flange Shapes-Side.rfa” family to show coping
- Creating a Repeating detail by using the existing “Reinf Bar Section.rfa” family Rebar 2D Component
- Using detail lines to create a 2D Detail family to show Elevation Rebar elements
Creating Custom 2D Drafting Details

Creating a repeating detail within a Line Based Detail family

- Creating a void form using a 2D detail component
- Composite Deck 2D component family
- Show how to change all the Family types of a parameter to the same value in a family
Creating Custom 2D Drafting Details

Template Families used to create these Detail Components:

- Detail Item line based.rft
- Detail Item.rft
- Generic Annotation.rft
Creating Custom 2D Drafting Details

Revit is NOT Backward Compatible!!!

- Revit is ONLY forward compatible.
- If you create a detail family in Revit 2016 you will not be able to use that same detail component family for a project in Revit 2015.
- Many times I would edit a family in Revit 2016 or 2017 project and wanted to add it the detail family library but could not do so. I had to recreate the families in Revit 2015.
- I will be using Revit 2015 for this presentation for this reason alone.
2D Detail Component Families with Text Labels

Generic Annotation.rft (nested families) & Detail Item line based.rft (hosted family)
Center Line & Grid 2D Component Family

Created family using *Detail Item line based.rft*:

- Reference Planes
- Label & Visibility Parameters

Family Loaded into Project:

Length = 4' - 0"
Center Line & Grid 2D Component Family

Nested families using Exist. Annotation families:

- Reference Planes
- Label & Visibility Parameters

Started with the “Out-of-the-Box” Annotation family: Grid Head - Circle.rfa”

Started with the “Out-of-the-Box” Annotation family: Centerline.rfa”
Center Line & Grid 2D Component Family

Edited the Nested Annotation families:

- Label & Visibility Parameters

Nested Family:
CL Annotation.rfa

Nested Family:
Grid Annotation.rfa
Center Line & Grid 2D Component Family

Created family using *Detail Item line based.rft*:

- Reference Planes
- Label & Visibility Parameters

### Family Types

<table>
<thead>
<tr>
<th>Name:</th>
<th>Centerline</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Formula</th>
<th>Lock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (default)</td>
<td>4’ 0”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEXT (default)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid Text (default)</td>
<td>GRID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Text (default)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Text (default)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid Bubble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centerline</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Identity Data
Slope 2D Component Family

Created family using *Detail Item line based.rft (Hosted Family)*:

- Reference Planes
- Label Parameters
- Flip Controls

Family Loaded into Project:

Hosted Family: Arrow Symbol.rfa

Length = 4' - 0"

EQ

EQ
Slope 2D Component Family

Created family using *Generic Annotation.rft (nested families)*:

- Reference Planes
- Label Parameters
- Filled Regions

Nested Family: Arrow.rfa

Nested Family: Slope Label.rfa

![Family Types](image)
Create Detail Section Mark

Family loaded into Revit Project:

- Properties > Instance Parameters
Create Detail Section Mark

Created family using *Detail Item line based.rft*:

- Assign Parameters in the Host family

**Hosted Family:** Section Mark.rfa

Length = 4' - 0"
Create Detail Section Mark

Nested families using Exist. Annotation families:

- Assign Parameters in the Host family

**Nested Family:** Section Head.rfa

**Nested Family:** Section Tail.rfa
Create Detail Section Mark

Created family using *Generic Annotation.rft*:

- Label Parameters
- Angle Parameter

Nested Family: Angle Label.rfa

Nested Family: Text Label.rfa
Create Section Cut

Family loaded into Revit Project:
- Properties > Instance Parameters
Create Section Cut

Created family using *Detail Item line based.rft (hosted family)*:

- **Length**: 6' - 0"
- **Text Height**: 0' - 10"
- **Height**: 2' - 0"
Create Section Cut

Created family using *Generic Annotation.rft (nested families)*:

- Label Parameters
- Angle Parameter
- Filled Regions

**Nested Family:** Arrow.rfa

**Nested Family:** Label with Angle.rfa

**Nested Family:** Text Label.rfa
Poll Question

What are the advantages to detail components (DC) vs. detail lines/filled regions (select all that apply)

- DC can have nested annotation families that change according to the scale of the view
- DC can switch from one type of element to another type
- DC can have text labels that rotate.
- DC can flip in all directions using control grips.
Demo – 2D Detail Component Families with Annotation & Symbols

Center Line & Grid 2D component family
Slope 2D component family
Section Cut 2D families
Using Existing 2D Detail Components & Linework

Creating a 2D detail coping beam,
Repeating details,
Using a detail family instead of linework
Coping W-Shape Elevation 2D Family

Family loaded into Revit Project:

- Properties > Instance Parameters
Coping W-Shape Elevation 2D Family

Edited the “out-of-the-box” family *AISC Wide Flange Shapes-Side.rfa*:

- Reference Planes
- Label & Visibility Parameters
- Masking Regions
- Locking Dimensions
Coping W-Shape Elevation 2D Family

Edited the “out-of-the-box” family *AISC Wide Flange Shapes-Side.rfa*:

- Existing parameters in the detail component family.

![Family Types](image)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Formula</th>
<th>Lock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (default)</td>
<td>4’ 0”</td>
<td>=</td>
<td></td>
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<td>Structural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>26.000000</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>7.70</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tf</td>
<td>0’ 0 3/8”</td>
<td>=</td>
<td>✓</td>
</tr>
<tr>
<td>k</td>
<td>0’ 0 7/8”</td>
<td>=</td>
<td>✓</td>
</tr>
<tr>
<td>bf</td>
<td>0’ 6 1/2”</td>
<td>=</td>
<td>✓</td>
</tr>
<tr>
<td>d</td>
<td>1’ 0 1/4”</td>
<td>=</td>
<td>✓</td>
</tr>
<tr>
<td>Identity Data</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coping W-Shape Elevation 2D Family

Edited the “out-of-the-box” family **AISC Wide Flange Shapes-Side.rfa**:

- Added parameters to display the coping at all corners of the beam

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Cope Radius (default)</td>
<td>0’ 1”</td>
</tr>
<tr>
<td>Cope Width (default)</td>
<td>0’ 3”</td>
</tr>
<tr>
<td>Cope Top Depth (default)</td>
<td>0’ 1 1/2”</td>
</tr>
<tr>
<td>Cope Bottom Depth (default)</td>
<td>0’ 1 1/2”</td>
</tr>
<tr>
<td>Cope Bottom Drop (default)</td>
<td>0’ 10 179/256”</td>
</tr>
</tbody>
</table>

Other:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Cope Left (default)</td>
<td></td>
</tr>
<tr>
<td>Bottom Cope Left (default)</td>
<td></td>
</tr>
<tr>
<td>Top Cope Right (default)</td>
<td></td>
</tr>
<tr>
<td>Bottom Cope Right (default)</td>
<td></td>
</tr>
</tbody>
</table>
**Rebar 2D Components – Elevation**

Created family using *Detail Item line based.rft*:

- Detail Lines
- Reference Planes
- Label & Visibility Parameters

---

![Family Types](image-url)

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (default)</td>
<td>4’ 0”</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180° Hook Length (default)</td>
<td>0’ 2”</td>
<td></td>
</tr>
<tr>
<td>180° Hook Width (default)</td>
<td>0’ 3”</td>
<td></td>
</tr>
<tr>
<td>90° Hook Length (default)</td>
<td>0’ 6”</td>
<td></td>
</tr>
<tr>
<td>90° Hook Radius (default)</td>
<td>0’ 3”</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>180° Hook End (default)</td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>180° Hook Start (default)</td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>90° Hook End (default)</td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>90° Hook Start (default)</td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>Identity Data</td>
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<td></td>
</tr>
</tbody>
</table>
Rebar 2D Components – Elevation

Created family using *Detail Item line based.rft*:
Rebar 2D Components – Section using Repeating Details

Rebar Section 2D family only:

Repeating detail:
Rebar 2D Components – Section using Repeating Details

Rebar Section as a Repeated Detail:
Demo - Using Existing 2D Detail Components & Linework

Editing the W-section elevation family to add coping,
Repeating rebar section family,
Creating a detail family instead of using detail lines for elevation rebar
Creating a repeating detail within a Line Based Detail family

*Detail Item.rft (nested family) & Detail Item line based.rft (hosted family)*
Void Form 2D Component Family vs. Lines

Created family using *Detail Item line based.rft (hosted family)*:

Hosted Family: Void Form Component.rfa

Void Form Length = 5' - 6"

Length = 5' - 8"

Void Width = 0' - 2"

Void Length = 0' - 6"
Void Form 2D Component Family vs. Lines

Created family using Detail Item line based.rft:

- Reference Planes
- Label Parameters
- Array Parameters
- Formulas

![Family Types Table]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (default)</td>
<td>5' 8&quot;</td>
<td>=</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Void Form Length (default)</td>
<td>5' 6&quot;</td>
<td>= Array No * Void Length</td>
</tr>
<tr>
<td>Void Length (default)</td>
<td>0' 6&quot;</td>
<td>=</td>
</tr>
<tr>
<td>Void Width (default)</td>
<td>0' 2&quot;</td>
<td>=</td>
</tr>
<tr>
<td>Other</td>
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<td></td>
</tr>
<tr>
<td>Array No (default)</td>
<td>11</td>
<td>= Length / Void Length</td>
</tr>
</tbody>
</table>

Identity Data
Void Form 2D Component Family vs. Lines

Created family using *Detail Item.rft (nested family)*:
- This Detail family file used as a nested family

**Nested Family:** Void Form.rfa

- Void Form Length = 0' - 6"
- Void Form Width = 0' - 2"
Composite Deck 2D Component Family

Hosted Family (Multiple Ribs) *Detail Item line based.rft:*

Composite Deck with Concrete Detail - Line Based.rfa

- Length = 7' - 9"
- Composite Metal Deck Length = 6' - 0"
- Thickened Concrete Width = 0' - 9"
- Concrete Thickness = 0' - 4"
- Array Distance = 0' - 6"
Composite Deck 2D Component Family

Hosted Family (Multiple Ribs) *Detail Item line based.rft:*

- Reference Planes
- Label & Visibility Parameters
- Array Parameters & Formulas
- Associate Family Parameters (Driving a Host Parameter with a Nested Parameter for the Three Types - 1.5 VLI, 2 VLI, 3 VLI)
Composite Deck 2D Component Family

Nested Family (One Rib) *Detail Item.rft* template family:

- Reference Planes
- Label parameters
- Filled Regions (Rib & Concrete)
- Three Types (1.5 VLI, 2 VLI, 3 VLI)

Nested Family:
Composite Deck with Concrete - Section Detail.rfa
Composite Deck 2D Component Family

3 Types (Vulcraft Catalog):

1.5 VL, VLI

Maximum Sheet Length 42'-0
Extra Charge for Lengths Under 6'-0
ICBO Approved (NO. 3415)
Composite Deck 2D Component Family

3 Types (Vulcraft Catalog):

**VULCRAFT**

2 VLI
Maximum Sheet Length 42'-0
Extra Charge for Lengths Under 6'-0
ICBO Approved (No. 3415)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Thickness (default)</td>
<td>3&quot;</td>
<td>=</td>
</tr>
<tr>
<td>wr</td>
<td>7&quot;</td>
<td>=</td>
</tr>
<tr>
<td>rr</td>
<td>5&quot;</td>
<td>=</td>
</tr>
<tr>
<td>hr</td>
<td>2&quot;</td>
<td>=</td>
</tr>
<tr>
<td>Sr</td>
<td>12&quot;</td>
<td>=</td>
</tr>
</tbody>
</table>

Concrete Thickness = 3"
Composite Deck 2D Component Family

3 Types (Vulcraft Catalog):

**VULCRAFT**

**3 VLI**
Maximum Sheet Length 42'-0
Extra Charge for Lengths Under 6'-0
ICBO Approved (No. 3415)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Thickness (default)</td>
<td>3&quot;</td>
<td></td>
</tr>
<tr>
<td>wr</td>
<td>7 1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>rr</td>
<td>4 3/4&quot;</td>
<td></td>
</tr>
<tr>
<td>hr</td>
<td>3&quot;</td>
<td></td>
</tr>
<tr>
<td>Sr</td>
<td>12&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Concrete Thickness = 3"
Composite Deck 2D Component Family

Changing a parameter value for All Family Types:

- Add the value to the Formula field.
- Select the “Apply” button.
- All types in the family now have the same value for the given parameter.
Poll Question

What are the ways to repeat a detail component

- By using the Repeating Detail Component tool in Revit project file
- By using the Array tool in the Revit project file
- Arraying a nested detail item family and assigning the Array No. dimension to a parameter in the detail line-based component family
- None of the above
Demo - Creating a repeating detail within a Line Based Detail family

Creating a void form
Composite Deck 2D component family
Thank You!

2D Component Families:

- Many of the families shown in this presentation are ones that I created for Fortis Structural, LLC.

- Many thanks to Joe, Adam, and Paul for allowing me to demonstrate these items to all who are watching this webinar.

- Fortis Structural, LLC is a Structural Engineering Firm located in Denver, CO.
Resources

RTC - Revit - Detailing, Glenn Cunnington

AU 2011 - Detailing in Revit, Paul F. Aubin

AOTC Revit Structure 2009 - Working with Detail Components and Managing Details

AUGI CAD Camp - Get All Your Details Done in Revit, David Cohn

Tag/Standard Details - Converting Standard Details to Revit, Brian Mackey
https://randomwhitenoise.wordpress.com/tag/standard-details/

BIM Manager – Revit 2D Details, Michael Earley  http://www.bim-manager.net/2012/05/2d-details-part-1.html

Working with Detail Components and Managing Details- Chapter 1
Creating Custom 2D Drafting Details

Learning Objectives:

- Understand the depth and complexity of 2D detail components and how they apply in Revit.
- Identify when to use 2D detail components instead of detail lines/filled regions.
- Layout the process for creating 2D detail components using Revit templates and existing 2D components.
Tips & Tricks in Revit Structure - Creating Custom 2D Drafting Details

Q & A

Thank you for attending!

Betsy.Werra@LearnWithSEU.com
CHALLENGE QUESTION:

Which family that was used in today’s session is the answer to this session’s Challenge Question?

A. Grid Head - Circle.rfa  
B. Centerline.rfa  
C. Arrow Symbol.rfa  
D. Label with Angle.rfa

Please circle the answer that is announced so that you can use the information to complete your quiz for the Attendance Verified PDH.

Please note: No NY PDH will be provided for this session.