



Conditions for Success: Using the Conditional Subassembly in AutoCAD® Civil 3D®

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- CV114-2** Explore the functionality in Autodesk® Raster Design and AutoCAD® Map 3D for working with aerial imagery, viewing DEM data, editing scanned maps and photos, and converting raster data into vector. Learn how to accurately insert geo-referenced images; insert and correlate non-referenced images; access and manage imagery using image manipulation tools; improve image display with nonlinear tonal adjustment and palette controls; and create slope and elevation maps from DEM data. The class will also look at draping images on surface models and the raster capabilities of the AutoCAD Map FDO functions. This course is intended for Autodesk® Map 3D, Land Desktop, and Civil 3D® users of all levels.

About the Speaker:

Nick has been a QA analyst at Autodesk for the last year, working primarily on Civil 3D®. Prior to joining Autodesk, he worked as a consultant in the reseller channel, helping clients leverage their investment in CAD technology. He has helped clients implement Civil 3D across North America. Nick is also the Civil 3D beta program coordinator.



Introduction

Struggling using complex corridors that have many regions to accomplish the design requirements for your projects? Do you find that you need to use a certain subassembly, but only if some design criteria is met? New to corridors and want a little information on how they are put together?

If you answered yes to any of the above questions then this class is for you.

Corridor Building Blocks:

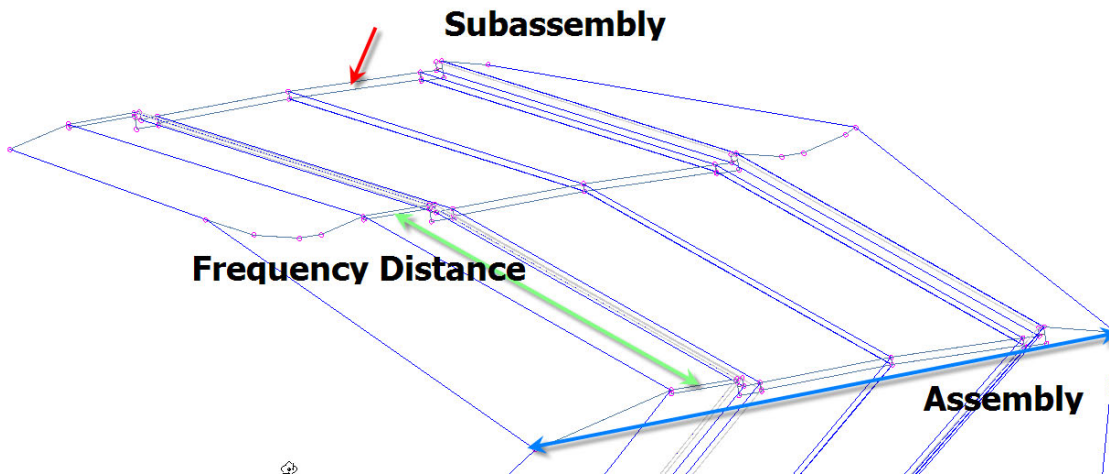
To construct a corridor a few things are required:

- An alignment (referred to as a baseline in the corridor UI)
- A profile
- An assembly (constructed from multiple subassemblies)

When working with corridors in Civil 3D you need to be familiar with the following terms:

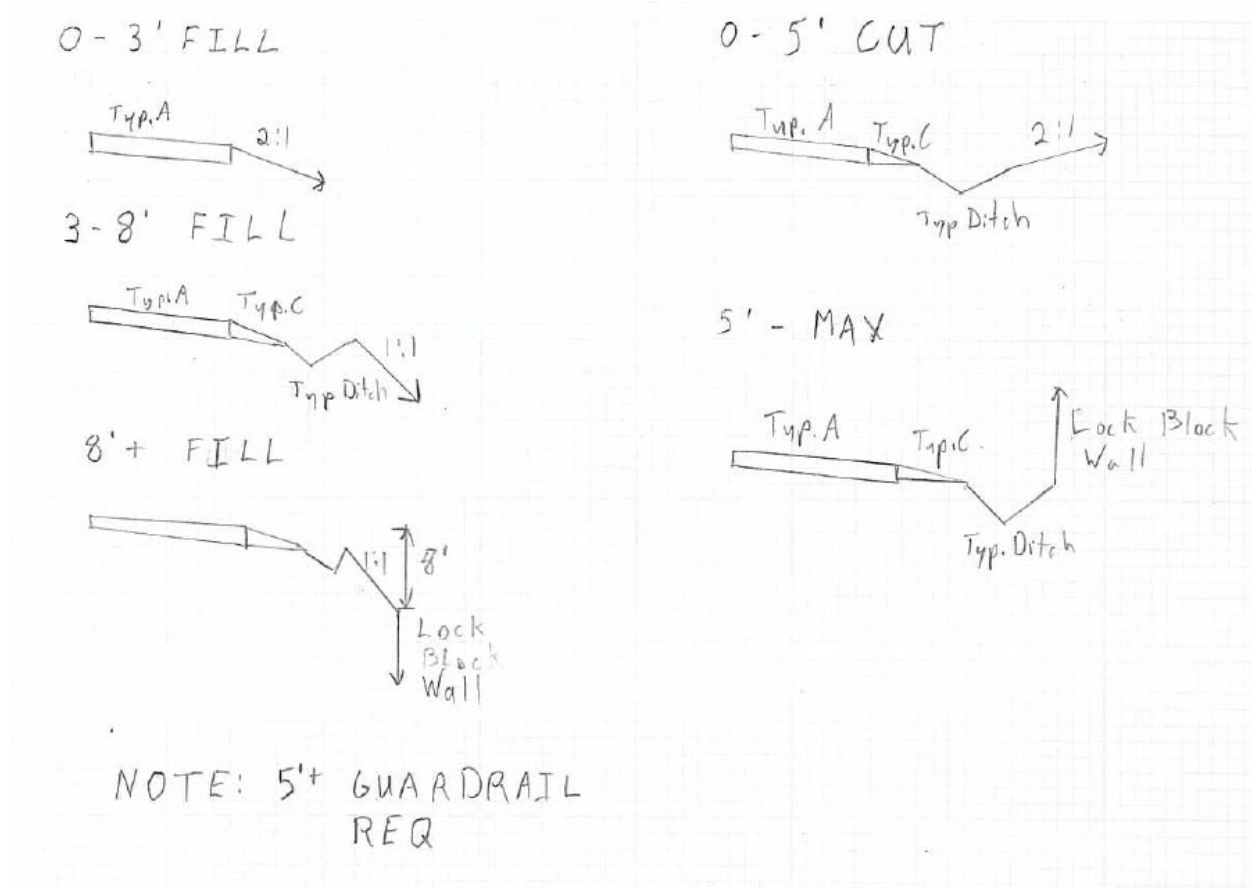
- A **region** is a subset of an alignment. You use regions to apply assemblies to ranges of corridor stations.
- The **frequency** is the increment at which an assembly is applied along a baseline.

When constructing a corridor the software takes the Assembly specified and places at the intersections of the Alignment and profile in 3D space at the frequency specified. Below is an image to help explain this.



Design Problem

Now that we know a little bit about how corridors are put together lets take a look at the design problem we are faced with solving. Our friendly design engineer has given us the following design sketches with typical cross sections that are required.



Based on our engineer's sketches we need the following:

- From 0-3' of fill a Type A lane is required, with a 2:1 fill slope
- From 3-8' of Fill a Type A lane, Type C shoulder and typical ditch with a 1:1 fill slope
- Over 8' of fill a Type A lane, Type C shoulder, Typical Ditch, 1:1 fill slope for 8 feet then lock block retaining wall.
- From 0-5' of cut a Type A lane, with a Type C shoulder, typical ditch and a 2:1 cut slope is required.
- Over 5' of cut a Type A lane, with a Type C shoulder and typical ditch followed by a lock block retaining wall is required.
- As well in the fill cases anything over 5' requires a guardrail be installed.

Conditional Subassembly(ies)

What is a conditional subassembly?

From Webster's dictionary we can see that Conditional means: true only for certain values of the variables or symbols involved

What does this mean to you as a C3D or Civil user?

A conditional subassembly can be used to help you make intelligent design decisions when building corridor designs. Conditional subassemblies do not draw graphics at design time, but evaluate logical decisions for which subassembly should be used if a given set of conditions is true.

Constructing an Assembly

In our example we will look at how we would achieve a design as outlined previously using the traditional approach, then we will look at using conditional subassemblies to achieve the desired results.

Traditional Subassemblies

In the design scenario described previously you as the designer would be required to create a minimum of 5 Assemblies. You would then be required to determine where the depths of cut/fill exceed your conditions, create a corridor region for that area and switch to the appropriate Assembly.

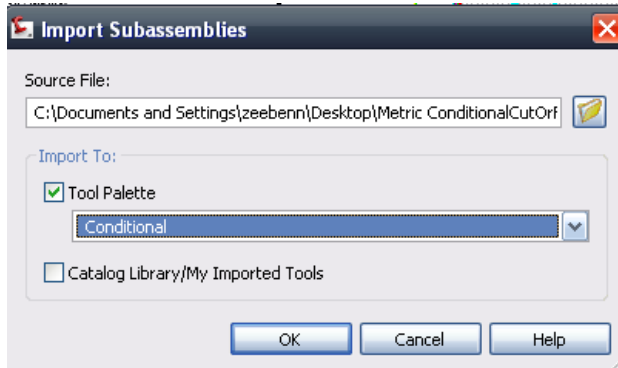
Sound like there should be a better way? Read on.....

Conditional Subassemblies

Shortly after Update 1 for AutoCAD Civil 3D 2009 and AutoCAD Civil 2009 a new subassembly was released to subscription center called conditional cut or fill. Read the additional resources section at the end of this paper to find out where to find.

Before we begin describing use we need to install the subassembly.

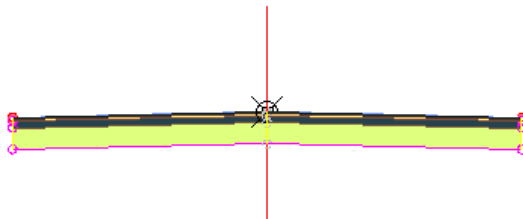
After downloading and Unzipping the file from subscription center launch C3D or Civil. On the Corridors menu, select Utilities, Import Subassembly.



In the dialog select your .pkt file and a palette to place the Subassembly on. Congratulations you are now ready to meet the conditions for success head on.

Let's take a look at building a single Assembly and one region in our corridor that will cover all of the design cases specified by our favorite design engineer. No that is not a typo, I said ONE subassembly.

1. Place a new Assembly Marker in your drawing, we will call it Conditional Assembly
2. Place a LaneInsideSuper on the left and right sides of the Marker



3. At the ETW on the right side place a ConditionalCutOrFill with the following parameters:

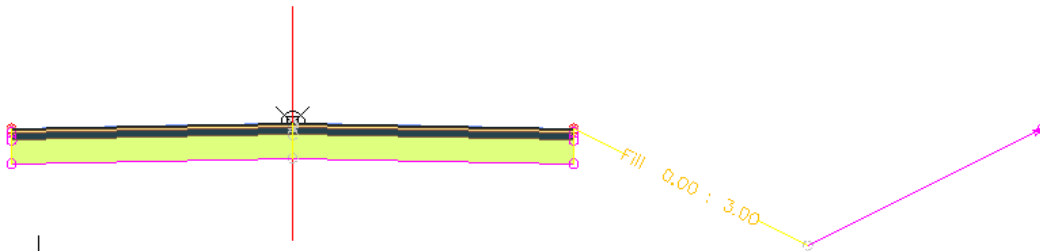
Type Fill
Layout Grade 2:1
Layout Width 5.0
Maximum Distance 3.0000'

Minimum Distance 0.0000'

- To that subassembly attach a LinkSlopeToSurface with the following subassembly

Add Link in Cut and Fill
 Omit Link No
 Side Right
 Use Superelevation Slope None
 Slope 50.000%
 Point Codes P2
 Link Codes Top,Datum

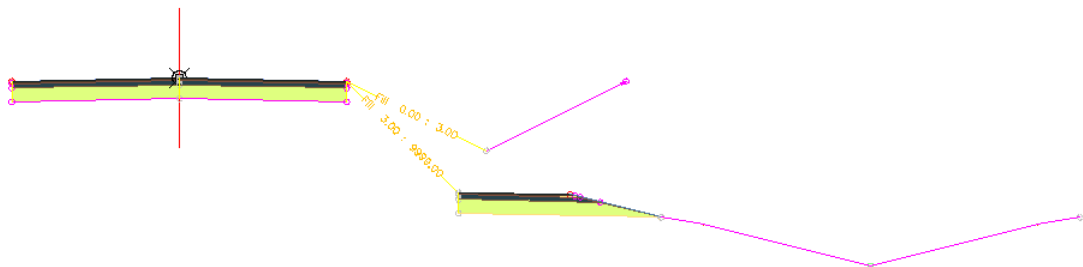
This now satisfies condition one from our design engineer. Lane Type A with a 2:1 slope in 0-3' of Fill. You should have the following on screen:



- Onto the next fill condition, we will add a second ConditionalCutOrFill subassembly with the following parameters at the ETW again.

Side Right
 Type Fill
 Layout Grade 1.000:1
 Layout Width 8.0000'
 Maximum Distance 9999.0000'
 Minimum Distance 3.0000'

- Next we attach ShoulderExtendAll, Ditch with the below parameter changes
 ShoulderExtendAll: Defaults
 Ditch:Defaults, except 0 for Ditch Width

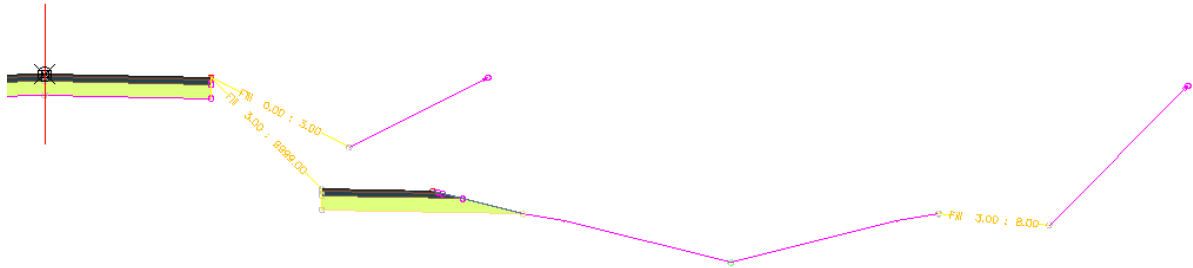


- At the end of the Ditch we will attach a ConditionalCutOrFill with the following parameters:

Side Right
 Type Fill
 Layout Grade 10.000:1

Layout Width 8.0000'
Maximum Distance 8.0000'
Minimum Distance 3.0000'

8. Attach a LinkSlopetoSurface with Slope set to 100%



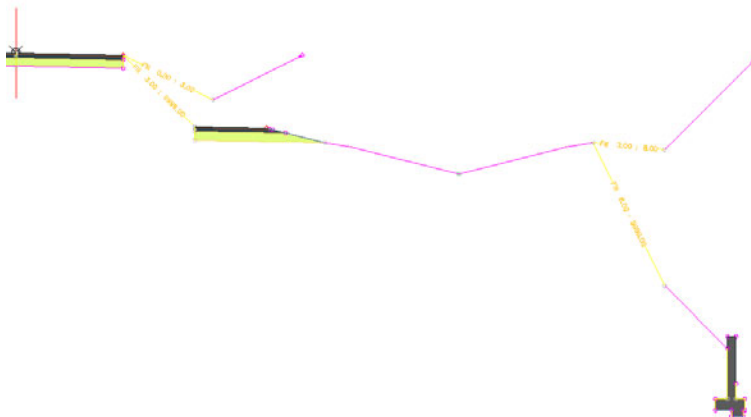
9. We now have 0-3' and 3-8' of Fill completed. Next we will solve the 8' + case. At the End of the ditch add an additional ConditionalCutOrFill subassembly with the below parameters:

Side Right
Type Fill
Layout Grade 0.500:1
Layout Width 8.0000'
Maximum Distance 9999.0000'
Minimum Distance 8.0000'

10. At the end of the new conditional add a LinkSlopeAndVerticalDeflection with parameters:

Omit Link No
Side Right
Use Superelevation Slope None
Slope 100.000%
Vertical Deflection -7.0000'
Point Codes P2
Link Codes Top,Datum

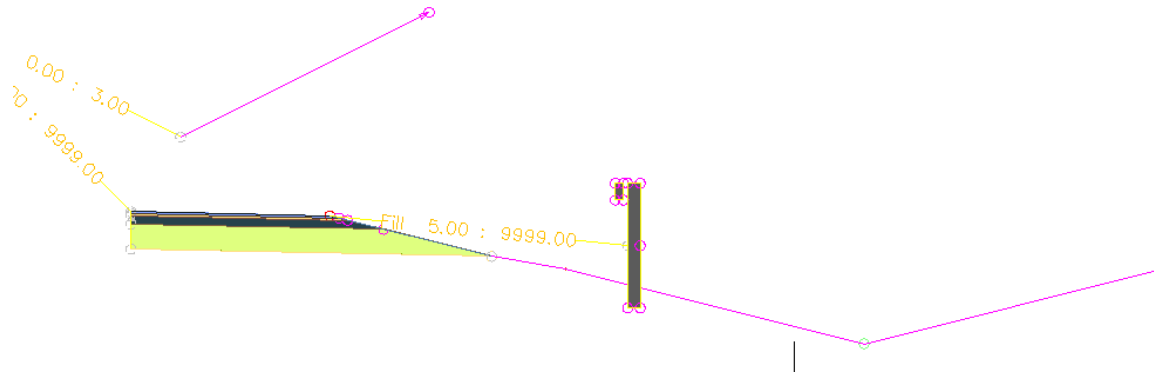
11. Now add a RetainWallVertical with default parameters, you should have an assembly that looks like the following.



12. Remember that our design engineer also specified a guardrail on 5'+ of fill, at the EPS point of the shoulder we will add an additional Conditional Cut or Fill Subassembly.

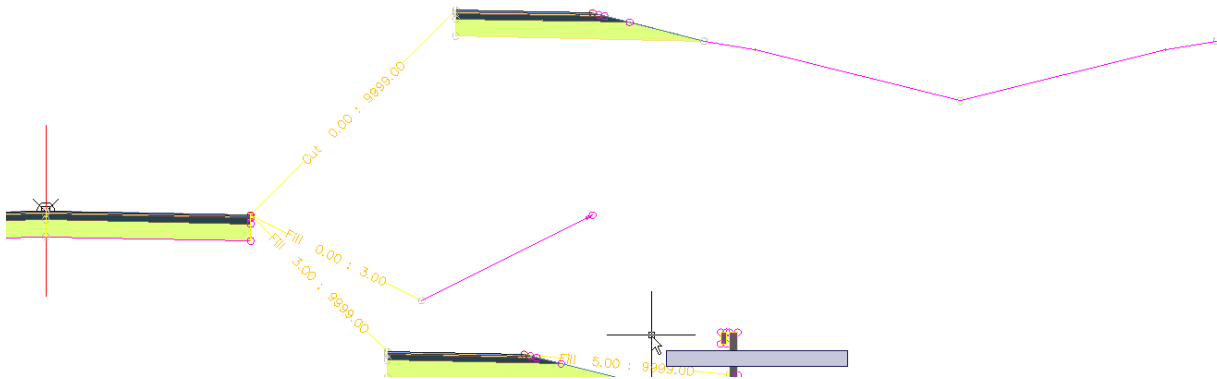
To that we will attach BasicGuardRail.

Value Name	Default Input Value
Side	Right
Type	Fill
Layout Grade	10.000:1
Layout Width	12.0000'
Maximum Distance	9999.0000'
Minimum Distance	5.0000'



13. The next step is to work on the Cut solutions, both require the shoulder and ditch so we will add a conditional subassembly that checks for cut. Then add shoulder and ditch. Parameters should be:

Side Right
 Type Cut
 Layout Grade 1.000:1
 Layout Width 12.0000'
 Maximum Distance 9999.0000'
 Minimum Distance 0.0000'



14. Depending on depth of fill we will add either a retaining wall or simple daylight link. The parameters for the Conditional Subassemblies to be attached to the back of ditch are:

Side Right
 Type Cut
 Layout Grade 1.000:1
 Layout Width 8
 Maximum Distance 5.0000'
 Minimum Distance 0.0000'

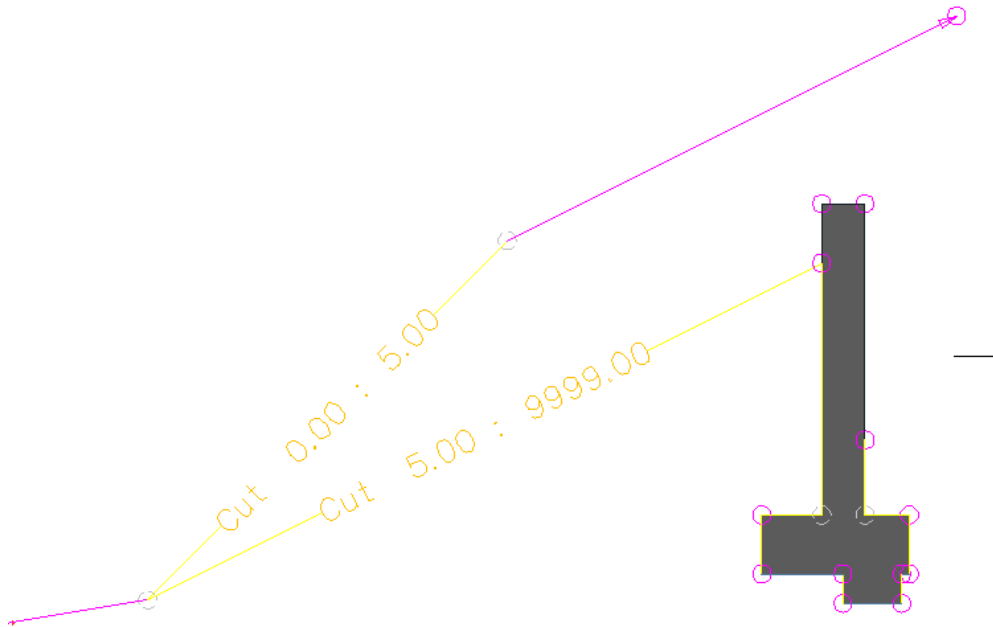
Side Right
 Type Cut
 Layout Grade 2.000:1
 Layout Width 15.0000'
 Maximum Distance 9999.000
 Minimum Distance 5.0000'

15. To the first Conditional we will add a LinkSlopetoSurface with the following parameters:

Add Link in Cut and Fill
 Omit Link No
 Side Right
 Use Superelevation Slope None
 Slope 50.000%

Point Codes P2
Link Codes Top,Datum

16. To the second conditional subassembly we will add RetainWallVert with default parameters



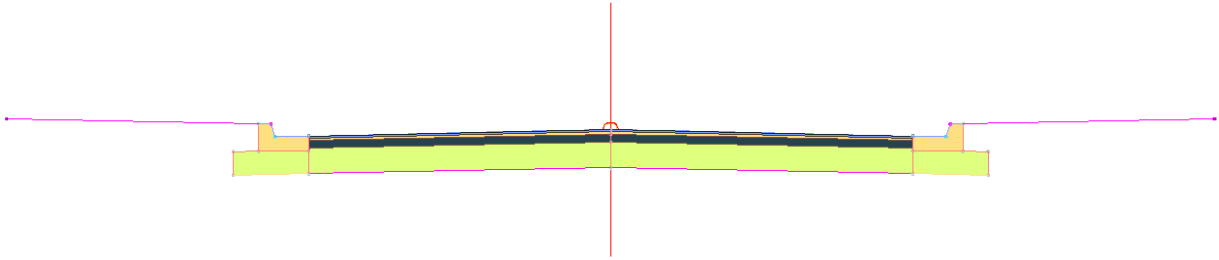
17. Select all of the subassemblies on the right side of the lane, right click and chose Mirror. Select the ETW of the left side lane to mirror the entire assembly.
18. Build a corridor, set surface targets and be amazed at the amount of work you have saved yourself in region editing etc....

Subassembly Utilities

Move To

When you use the AutoCAD Move command on a subassembly, the attachment point is maintained. While this works if you want to nudge a subassembly from its attachment point by a few inches, it will not move it to another marker point.

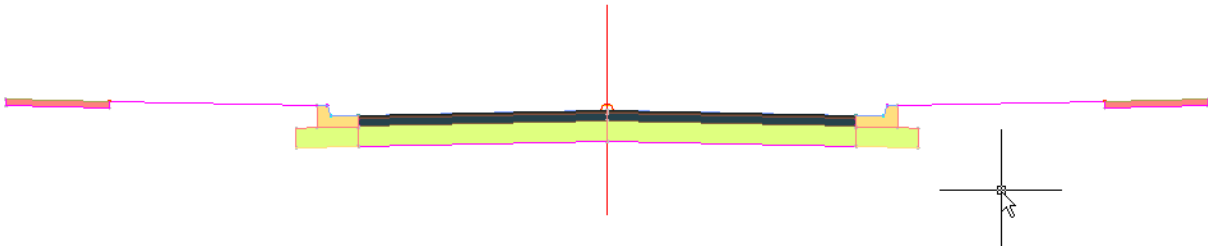
The subassembly Move To command works differently. For example, if you built an assembly that contained a grass boulevard but later were informed you needed to add a side walk before the grass the move to command becomes helpful.



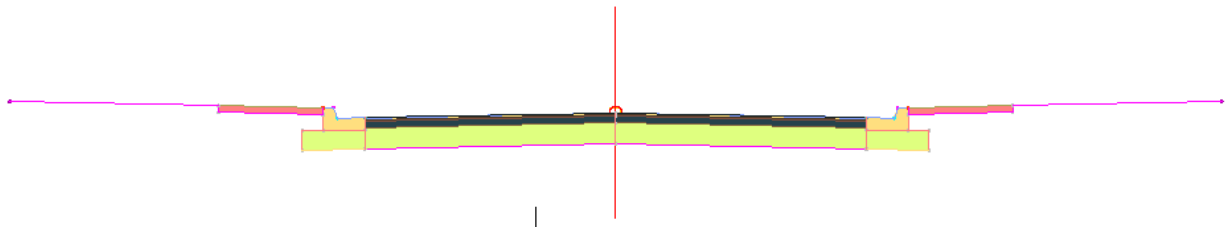
Assembly with grass buffer.

Without using the move to command we would be forced to delete the existing buffers, insert our sidewalk and then reinsert the buffers. We will next take a look at using the move to command to correct our design.

- 1.) Attach sidewalk to the buffer on the left and right sides.



- 2.) Select the buffer on one side, right click, select Move To and select the outer marker on the sidewalk, repeat for other side.



Corrected assembly, in fewer steps, never a bad idea to save yourself a few clicks.

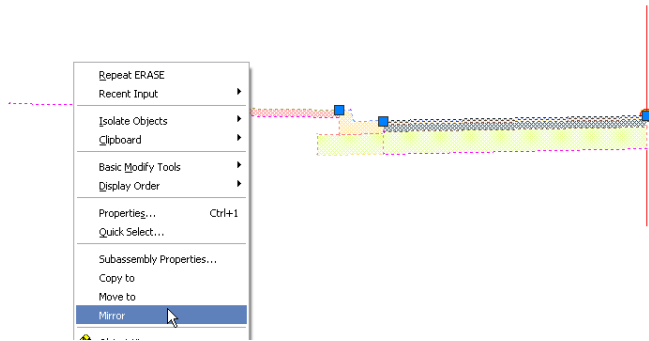
Note: If you needed to insert an additional lane the same procedure applies, but you would select all of the assemblies before where you need to insert when using Move To.

Mirror

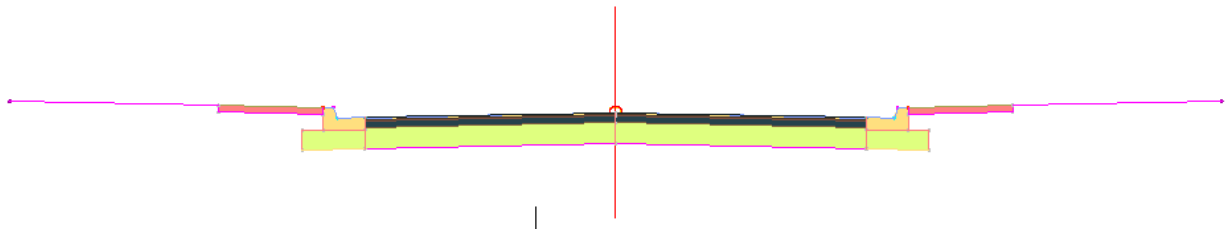
No not AutoCAD Mirror that would be too easy! Since corridors were added to Civil 3D end users have been asking why they couldn't define half the assembly when it is symmetrical like in Land Desktop. Ask no more.

How does it work?

Simply select the subassemblies you would like to mirror, right click choose mirror and the attachment point for your mirror.



Ready to mirror

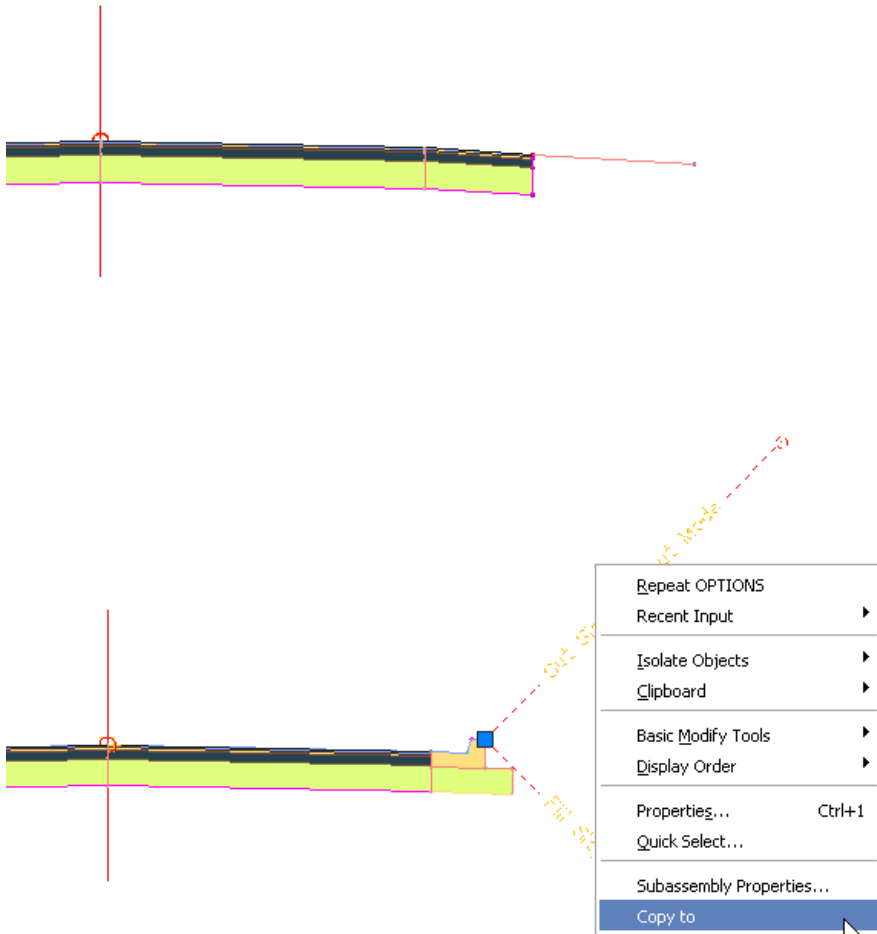


Ready to be turned into a corridor

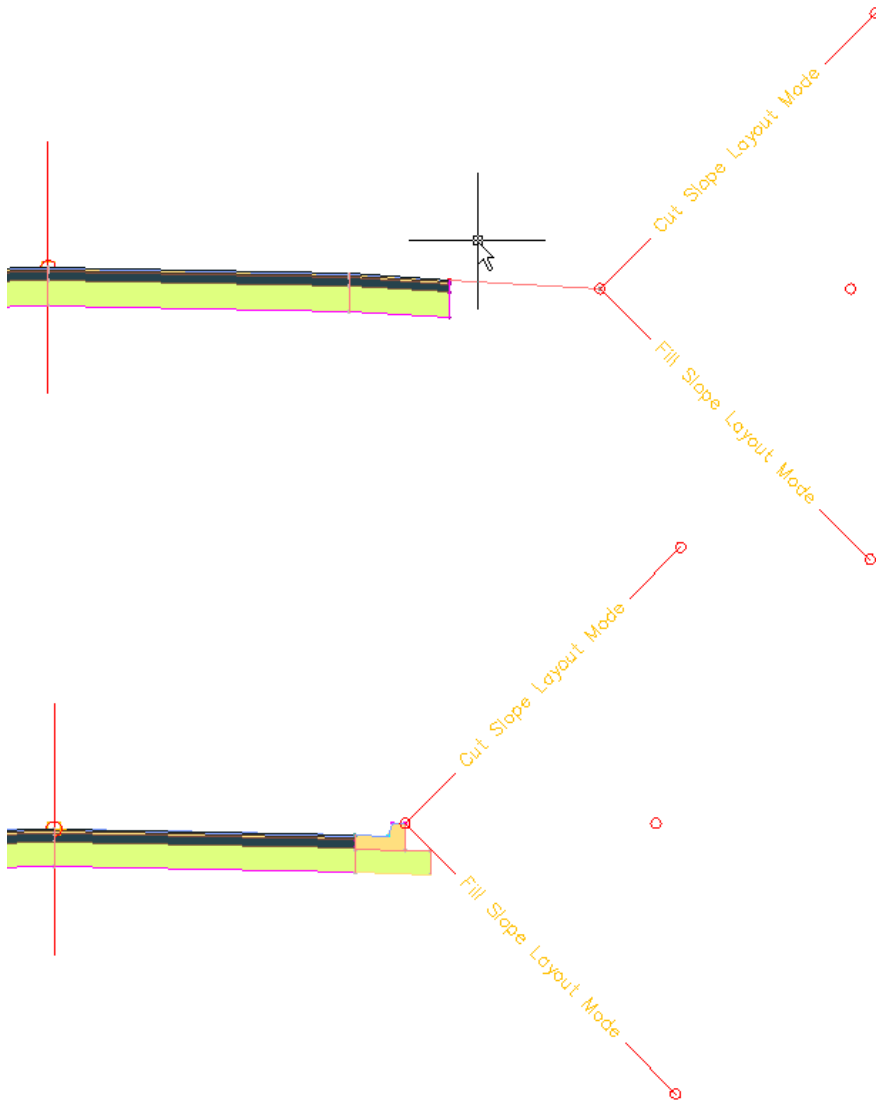
Copy To

That's right we aren't talking about a regular AutoCAD Copy, just like the Move and Mirror commands AutoCAD Copy doesn't know anything about the assembly to which your subassembly is attached. Copy To the rescue.

Perhaps you are creating a second assembly that contains a lane and shoulder instead of curb and gutter, however the daylight solution is the same, this is an excellent opportunity to use Copy To.



To complete the Copy To, simply select the subassembly or subassemblies you wish to copy, right click, select copy to and choose the new attachment location.



Subassembly and all of its input values copied to the new assembly.

Sharing Assemblies in your organization

C3D and Civil added the ability in 2009 to place complete assemblies on a Tool Palette without any additional steps. In this next segment we will look at how to share those assemblies with others in your organization.

Background information: How are the assemblies you place on tool palettes stored?

When you drag an assembly from the drawing editor space to a tool palette the product creates a new drawing file in the background and saves it to the Assemblies folder in the AECCONTENTDIR location specified in your installation. The new drawing file will have the same name as the assembly name you created.

Default location : C:\Documents and Settings\All Users\Application Data\Autodesk\C3D 2009\enu\Assemblies\

Your location may be different depending on your installation configuration.

Required tools: AutoCAD Civil 3D or AutoCAD Civil

Optional tools: XML editor

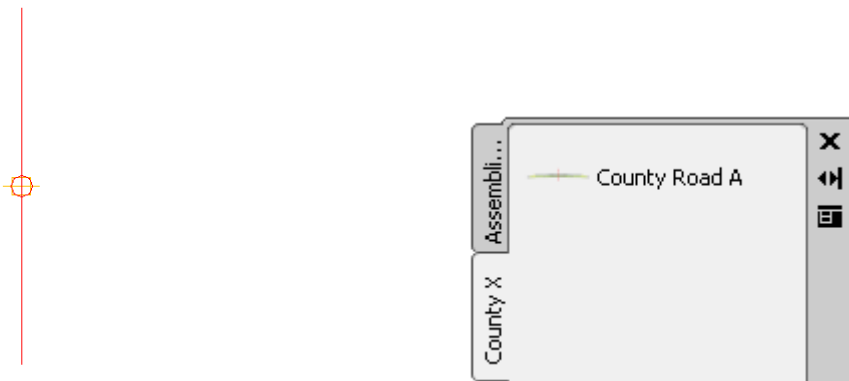
Step 1: Creating Assemblies for sharing

Start a new drawing using your favorite template of choice.

Create a new assembly in the drawing, configure and attach the subassemblies that make up your typical cross sections. (Our example will be called **County Road A**)

Step 2: Place the assemblies on a palette.

To place the assembly on a palette simply left click and hold on the assembly mark and drag it onto a palette(releasing the left click when you have it in the correct palette location) In our example the palette will be called County X



An assembly marker

Assembly on Palette County X

Step 3: Choices

We now need to decide how to deploy these subassemblies to our users. We have 3 basic options available to us as outlined below:

Option 1: Export an .xtp (Exported Tool Palette) file and copy required dwg files

Pros: Easy to do, easy to send to someone who may not be on your network.

Cons: Each user must import the .xtp file and place the dwg files in the correct location.

Option 2: Copy the .atc (Autodesk Tool Catalog) file and content to correct locations

Pros: Easy to do manually or a batch file can easily be run at login time that copies the appropriate files to the correct location.

Cons: Each user's machine will have a copy of the assembly dwg files

Option 3: Place the atc file and dwgs on the network in a read only location

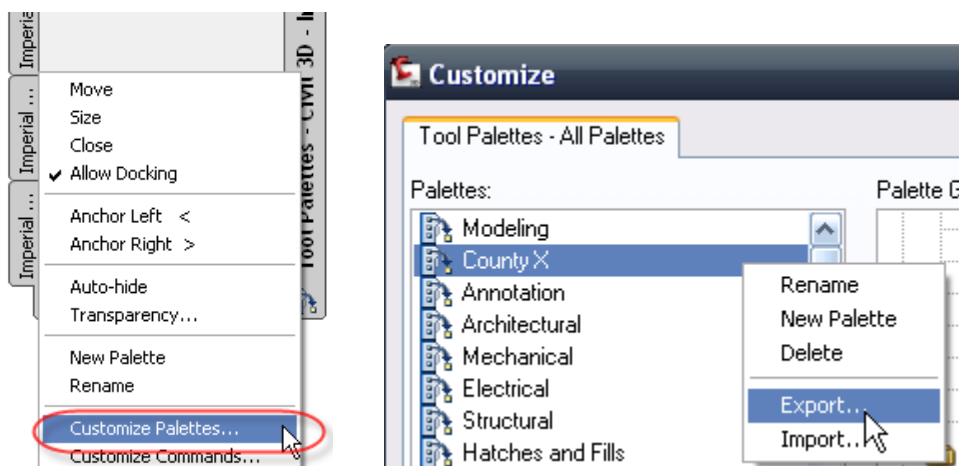
Pros: Only one copy of the dwg and atc file will exist, no batch file needs to be created

Cons: Somewhat more difficult as an xml editor must be used to edit the atc file.

You will need to review each of the options available to you and decide which best suits your organization.

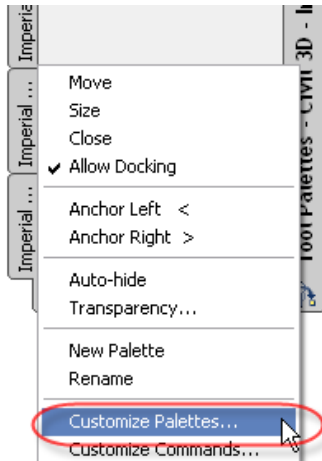
Option 1: Copy the .xtp and DWG files

- 1.) Copy the dwg files from the Assemblies directory on the system that you created them on.
- 2.) Right click on the County X Tool Palette and select Customize Palettes



- 3.) In the Customize dialog right click on the County X Palette and select Export

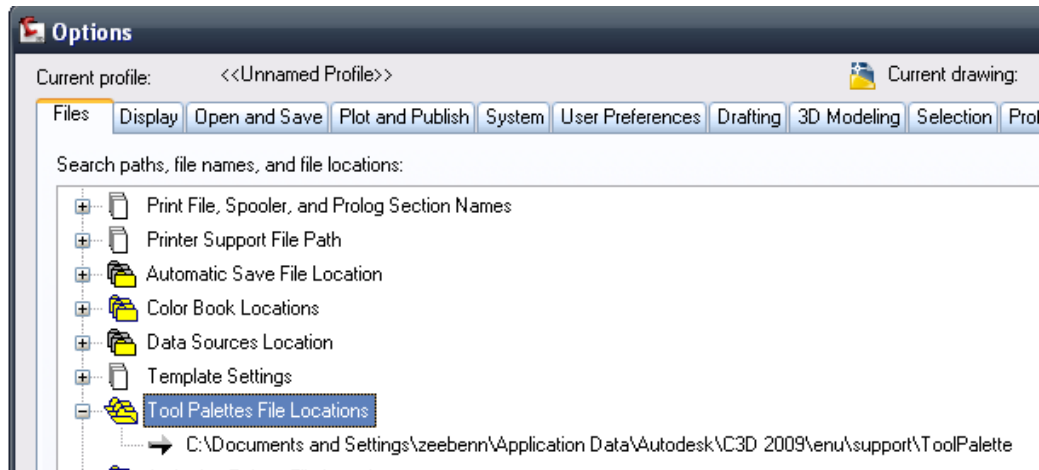
- 4.) Save the .xtp file to a location of your choosing.
- 5.) On the system where you wish to add the assemblies copy the dwg files to that machines content directory. Matching the path of the original machine.
- 6.) Open C3D or Civil and right click on a Tool palette and Select Customize Palettes.



- 7.) In the Customize dialog right click on a palette and select Import
- 8.) Select and import the .xtp file you previously exported
- 9.) You should now have a tool palette containing your custom assemblies, simply select one to place it in the drawing.

Option 2: Copy the dwgs and .atc Files

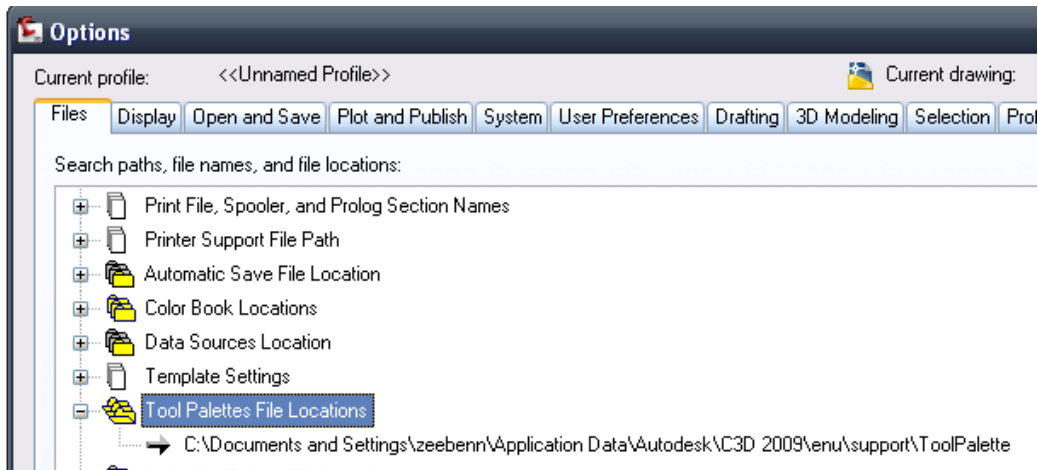
- 1.) Copy the dwg files from the Assemblies directory on the machine that you created them on.
- 2.) Open the AutoCAD Options dialog box, select the Files tab, make note of the Tool Palette File Locations path.



- 3.) Browse to that location in windows explorer, in the Palettes subfolder there should be an .atc file with the name of your Tool Palette followed by a GUID(Globally Unique Identifier) Copy this file.
- 4.) On the system where you wish to add the assemblies copy the dwg files to that machines content directory. Matching the path of the original machine.
- 5.) Open the AutoCAD Options dialog box, select the Files tab, make note of the Tool Palette File Locations path.
- 6.) In that directory in the palettes subfolder place the .atc file you copied from the originating system.
- 7.) Right click on a tool palette and select customize palettes, the new tool palette should appear in the list, place it in the group where you wish to have it appear in the UI.
- 8.) Your tool palette of custom assemblies is now available and ready for use.

Option 3: Copy and edit the atc

- 1.) Copy the dwg files from the Assemblies directory on the machine that you created them on.
- 2.) Open the AutoCAD Options dialog box, select the Files tab, make note of the Tool Palette File Locations path.



- 3.) Browse to that location in Windows Explorer, in the Palettes subfolder there should be an .atc file with the name of your Tool Palette followed by a GUID (Globally Unique Identifier) Copy this file.
- 4.) Open the .atc file using your favorite xml file editor (This example uses Visual Studio). You should see something similar to below.

```

<?xml version="1.0" encoding="utf-8" ?>
<Palette option="0">
  <ItemID idValue="{80810E93-2E48-464F-B8C1-7C73AE60468D}" />
  <Properties>
    <ItemName>County X </ItemName>
    <Images option="0" />
    <Time createdUniversalDateTime="2008-10-26T18:41:58" modifiedUniversalDateTime="2008-10-26T18:41:58" />
  </Properties>
  <Tools>
    <Tool option="0">
      <ItemID idValue="{175C4B20-5E3E-44C3-9514-7430B3572D95}" />
      <Properties>
        <ItemName>County Road A</ItemName>
        <Images option="0">
          <Image cx="64" cy="64" src=".\Images\Assembly_175C4B20-5E3E-44C3-9514-7430B3572D95.png" />
        </Images>
        <Description>Creates an assembly object.</Description>
        <Help>
          <HelpFile>.\Help\c3d.chm</HelpFile>
          <HelpCommand>HELP_HHUND_TOPIC</HelpCommand>
          <HelpData>C3D-UG-Assemblies_Assembly.html</HelpData>
        </Help>
        <Time createdUniversalDateTime="2008-03-07T17:37:05" modifiedUniversalDateTime="2008-03-07T17:37:05" />
      </Properties>
      <CustomData>
        <Version>5.7</Version>
      </CustomData>
      <Source />
      <ToolType>1</ToolType>
      <StockToolRef idValue="{15C5328D-6D6B-4621-ABAE-F169988F9E50}" />
      <Data>
        <AeccDbAssembly>
          <ExternalDrawing>%AECCCONTENT_DIR%\Assemblies\County Road A.dwg</ExternalDrawing>
        </AeccDbAssembly>
        <Units>foot</Units>
      </Data>
    </Tool>
  </Tools>
</Palette>

```

- 5.) You will need to decide where you are going to store the content on your network. In our example we will use a server whose name is CAD and a folder called Assemblies.

Change the following line:

```
<ExternalDrawing>%AECCONTENT_DIR%\Assemblies\County Road  
A.dwg</ExternalDrawing>
```

To:

```
<ExternalDrawing\CAD\Assemblies\County Road A.dwg</ExternalDrawing>
```

- 6.) Save the newly edited .atc and the dwgs to the location select on the network, this location should ideally be read only to your users.
- 7.) On the target system open the AutoCAD Options dialog box, select the Files tab, In tool palette file locations add the path to your newly edited ATC file.
- 8.) Your new tool palette will now be listed in the customize palette dialog.

Additional Resources:

Skill Builders

[Adding Cut and Fill Conditions to a Corridor Assembly](http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=7151908&linkID=9240695)

<http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=7151908&linkID=9240695>

Learn how to use the Conditional Cut Or Fill subassembly to build a corridor assembly that applies different subassemblies depending on the cut or fill condition at a given station. The conditional subassembly enables you to reduce the number of corridor regions and assemblies that you have to maintain. (August 2008)

 [civil3d_2009_skillbuilder_conditional_subassembly.zip](#) (zip - 5229Kb)

Sharing Corridor Assemblies in AutoCAD Civil 3D 2009

Learn how to save corridor assemblies for easy reuse. In this skill builder, you will add assemblies to a tool palette, save the tool palette to a tool catalog in Content Browser, and then publish the tool catalog so that other users can access it. (April 2008)

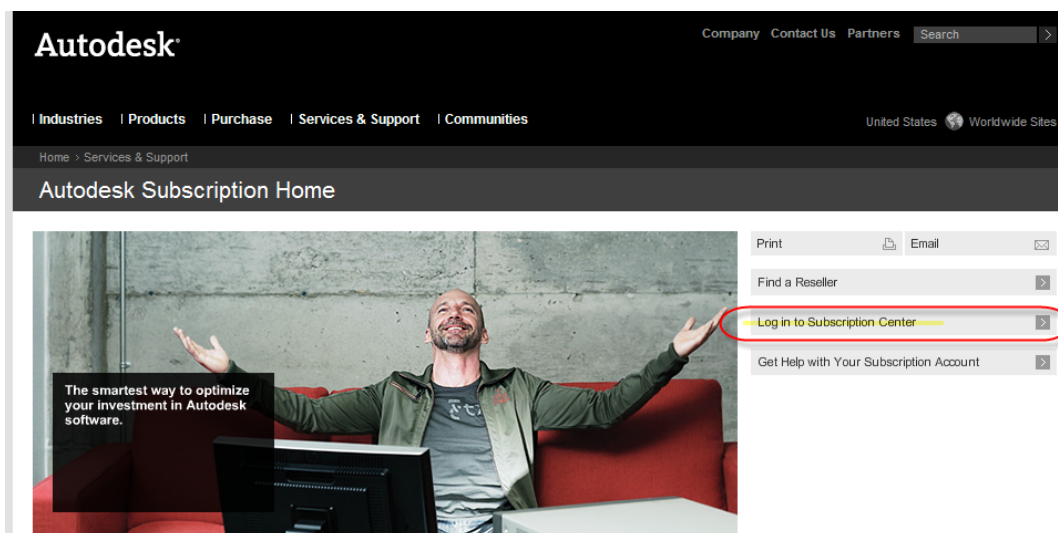
 [civil3d_2009_skillbuilder_assemblies.zip](#) (zip - 3676Kb)

ConditionalCutorFill Subassembly

Available for download on subscription center.

If you do not have access to subscription center you will need to ask your contract administrator(Person responsible for purchasing your software)

[www.a Autodesk.com/subscription](http://www.autodesk.com/subscription)



Login link on the right hand side

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After logging in you will want to select Product down loads on the left side menu

	Content	
Revit Structure 2009 64-bit	Application	2008-09-29
Stage Storage Extension for AutoCAD Civil 3D 2009	Extension	2008-08-21
Subassemblies for AutoCAD Civil and Civil 3D 2009	Extension	2008-08-21
US Content Extension for AutoCAD MEP 2009	Extension	2008-10-09
Visual CAD 9.2.0 Standalone	Extension	2008-07-07
Worksharing Monitor for Revit 2009	Extension	2008-09-29

[See All](#)

Locate the correct extension download(near the bottom of the list at time of publishing)

Conditional Cut Or Fill

This subassembly automatically applies various subassemblies, such as generic links, widening, ditching, or day lighting subassemblies to an assembly based on whether a cut or fill condition exists.

For a lesson on how to use the Conditional Cut Or Fill subassembly, [download the Skill Builder](#).

Download - Imperial

[English \(zip - 5762Kb\)](#)

Download - Metric

[English \(zip - 5762Kb\)](#)

Simply select the appropriate units for the work you do(Imperial or Metric)

Unzip and Install per the instructions earlier in the document