Details: an Unsung Hero of Autodesk® Architectural Desktop

Peter Funk

BD22-4L Many professionals have yet to discover how using the Details module in Autodesk® Architectural Desktop can take them to a higher level of productivity. If you're looking for a more simplified way of creating details for your construction documents, this hands-on lab is for you. We'll create details using various tools and material libraries, automate annotation, and generate a detail library. Finally, we'll review tips and tricks that make the Details module a time-saving 'unsung hero.'

About the Speaker:
Peter has taught customization of Autodesk® Architectural Desktop to developer partners around the world. He has also worked as a programmer for both Autodesk and Softdesk. He currently works to provide implementation and customization support to Building Industry customers.
peter.funk@autodesk.com

Details are a major part of a set of architectural construction drawings and can make the difference between a good job and a great job. Using AutoCAD to create details had been the greatest leap forward in technology for details since the creation of the "sticky-back". To supplement AutoCAD, there have been a number of great add on packages for details that were created back in the late 1980's such as the Vertex Detailer and Softdesk Details. Over the years, focus has moved from 2D to 3D, and selling detailing tools has moved into the background. However, Details has always been part of Autodesk Architectural Desktop, we just forgot to tell people about it! In Architectural Desktop 2004, the material and keynote databases of Details were rewritten and given a new user interface to bring the product back to the forefront.

Details was designed for one task: the creation of 2D construction details for architects and engineers. The core of the application is a database of component materials that produces basic 2D AutoCAD entities with just enough data on them for automated / semi-automated annotation.

This lab will cover the key parts of detailing with Architectural Desktop's Details menu.

- Setting up the drawing for a detail
- Drawing a detail using the component database
- Editing materials
- Annotation
- Material Library
  - Adding new sizes using the "specify" option
  - Adding new sizes by editing the database
  - Adding a new material using blocks
- Detail Management
- Tips and Tricks

Setting up the detail drawing

Before we start drawing our detail, we need to set the drawing scale. You may ask, "Why do I need to set the drawing scale before I draw a detail. AutoCAD draws at 1:1 and the only time I need to worry about scale is when I plot?" There are three reasons that you need to know your scale before you start drawing: It changes what you draw, a (i.e. 3/8" = 1'-0" (1:30) wall section shows a different set of information than a 3" = 1'-0" (1:5) wall section), it controls where you place annotation, and it sets the hatch pattern density. So before we start drawing, we set the drawing scale.

Format->Drawing Setup

In the "Drawing Setup" dialog box, select the "Scale" tab and choose a scale of 1"=1-0" (Figure 1).
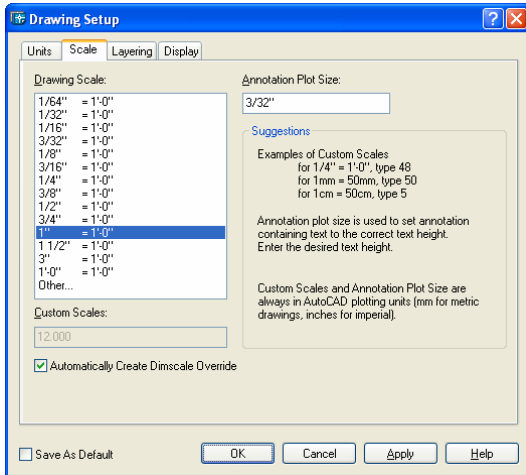
Figure 1

The next thing we are going to do is zoom into a portion of the drawing to do our detail in. Here is a trick that I use when drawing details: if you want a detail with a drawing scale of 1" = 1'-0" to fit into about an 8x8 square, you can figure that your detail will be about 8' tall, so zoom into an 8' tall part of the drawing.

```
Command: z ZOOM

Specify corner of window, enter a scale factor (nX or nXP), or

[All/Center/Dynamic/Extents/Previous/Scale/Window] <real time>: c

Specify center point: Pick any point on the screen

Enter magnification or height <50'-0">: 8'
```

Drawing the Detail

Now that we have our drawing setup, we can draw our first detail. Don't worry if you don't finish the detail in the time allowed, don't worry about it. There are a few key things that we want to illustrate up front to make creating details a little more understandable, and then we will move on.

Four general material placement tools (or jigs) that Details uses again and again to draw material components are:

- Stamping
  Used to place a copy of an element in the drawing. It has options for flipping, moving, rotation

- Array
  Start like the stamp jig, but then allows for an array of elements in the drawing

- Linear
  Draws a line, and an offset side, and uses these to draw a more complex material

- Drawn
 You draw the material using a variation of the polyline command.

Steel Frame

We'll start with by placing a W18x35 steel beam with a stamp jig.

Details->Material Compose

Details: an Unsung Hero of Autodesk® Architectural Desktop

In the Select Material dialog box the W18x35 will be under "O5 – Metal", "Structural Shapes", "AISC", "AISC Wide Flange Shapes", then scroll down till you find the size. Either Double click on the line, or select "OK" to start the drawing routine. Accept all the defaults, and place a single copy of the beam in your drawing, near the top center of the screen.
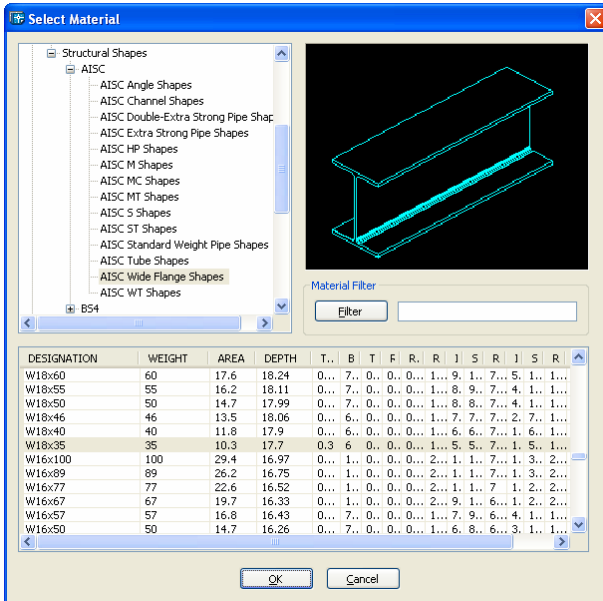

```
Steel shape view [Top/Elevation] <Section>:

Draw shape from [Centroid] <TOS>:

Hatch item [No] <Yes>:
```

Next we'll draw a 6x6x1/2" steel tube for a column using one of the linear draw routines. Use the "Elevation" option, and place the tube by the "centroid". Draw the tube from the midpoint of the top of flange of the W18x35, and then down 10'. We'll cut off the excess later.

To this, add a W8x15. Place it 2'10" below the bottom of the W18, and flush with the right side of the tube. There are a couple of ways to do this. You could just draw it anywhere and move it into position, or you can use the stamp jig to place it. To use the stamp jig, accept all the defaults, and place the W8 at the mid point of the bottom flange of the W18. Then type "M" to move the W8 down 2'10". The jig's default prompt is to select a new base point. Select the right hand corner of the top flange, and then use "M" again to move it over to the right side of the tube. Press "Enter" to end the command.

Masonry

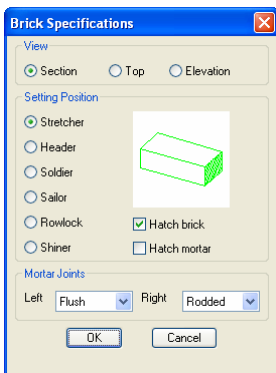Now we are going to add some bricks to the outside wall.

Figure 2

I used a standard brick, with a flush left mortar joint (inside the wall) and a rodded mortar joint on the outside of the wall. Start the brick at the bottom right side of the tube, select the default mortar, and then "M" move the

brick and mortar 1 ½" to the right. After it's in place, press "Enter" and then array the brick and mortar 1' 4' above the top of the tube (11 4" overall).

Now, were going to replace three courses of the brick with a solider course. Zoom into the top to the tube, and erase the three bricks and their mortar (Figure 3).
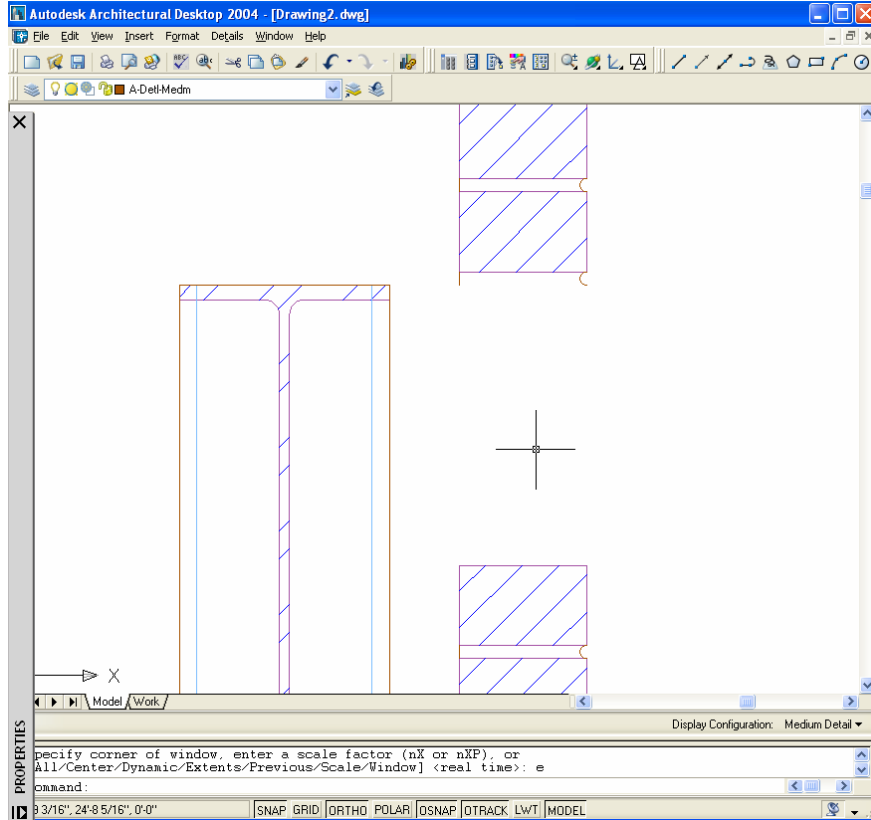

Figure 3

Use the "Material Repeat" command to repeat the last material used. When the "Brick Specifications" dialog comes up, change the "Setting Position" from "Stretcher" to "Solider" (Figure 4) and place 1 course of brick (Figure 5).
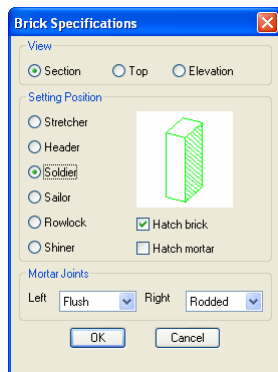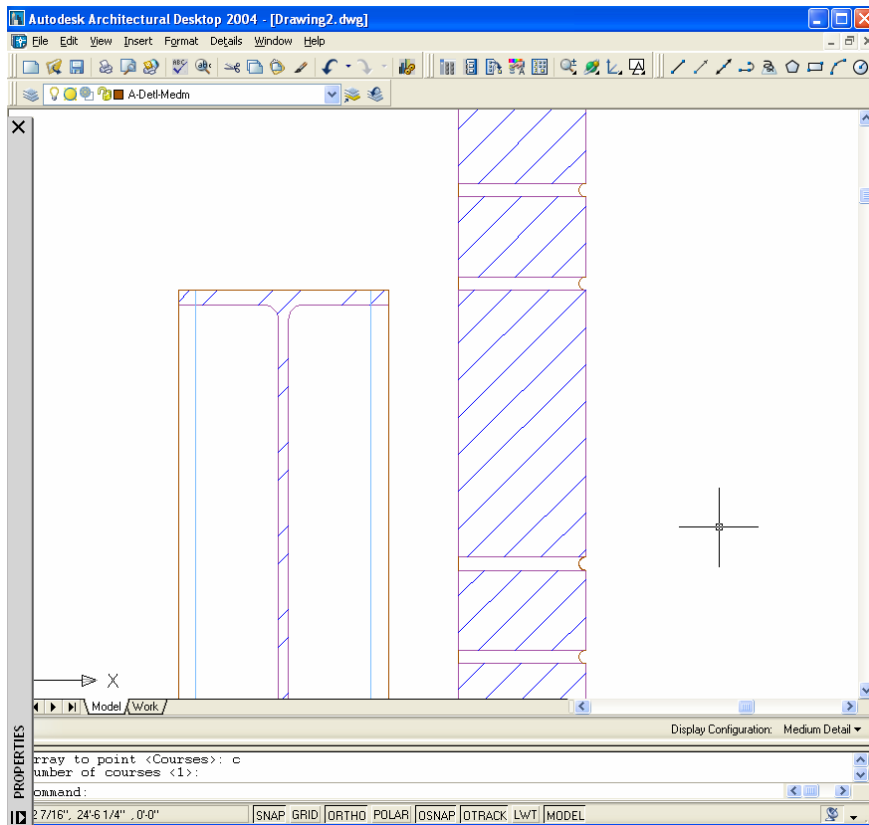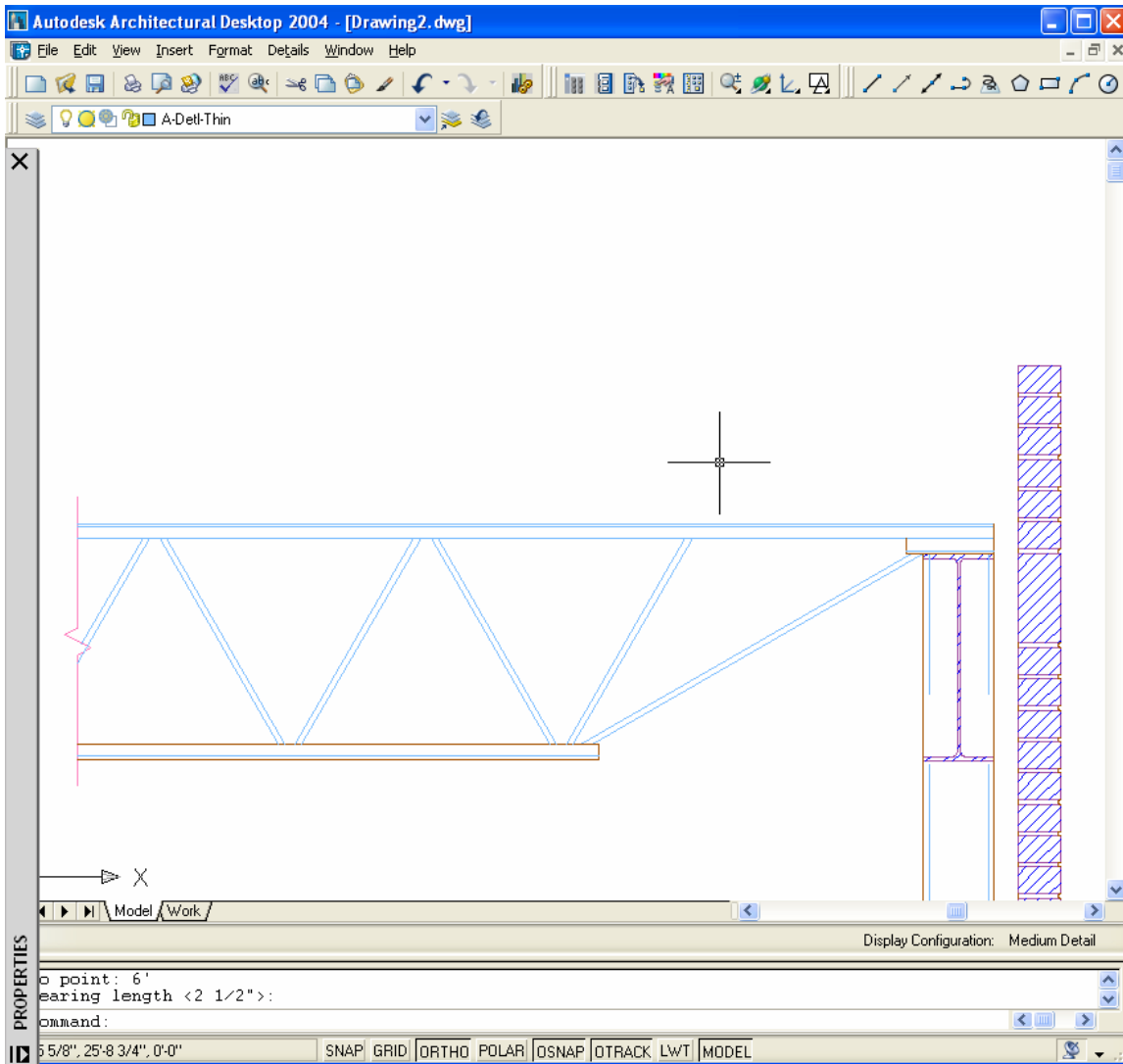

Figure 4

Figure 5

Roof Structure

Now that we have the basic wall laid out, we can start on the roof. The structure of the roof will be a 20H8 Bar Joist. Draw the joist in elevation with the top left corner of the W18 as the starting point. Draw about 6' of joist to the left, and use the top right corner to set the bearing length (Figure 6).
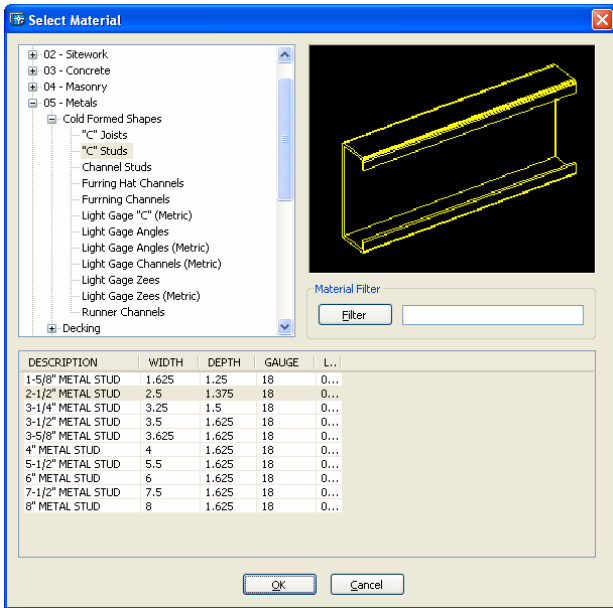
Figure 6

Next, place a 1.5 NR 22 roof deck on the joist. You may need to expand the first column of the roof deck table to see all the sizes.

Parapet Wall

Now that we have the roof deck, we can work a little on the parapet wall. Start with a 2-1/2" metal stud. Note: there are metal studs in both the 05 Metals and the 09 Finishes division. For the exterior wall we want to use those from 05 Metals (Figure 7).

Details: an Unsung Hero of Autodesk® Architectural Desktop

Figure 7

Start the stud at the location shown in Figure 8. Use "Object Snap Tracking" to acquire the point, draw the metal stud 1'1 ¾" long.
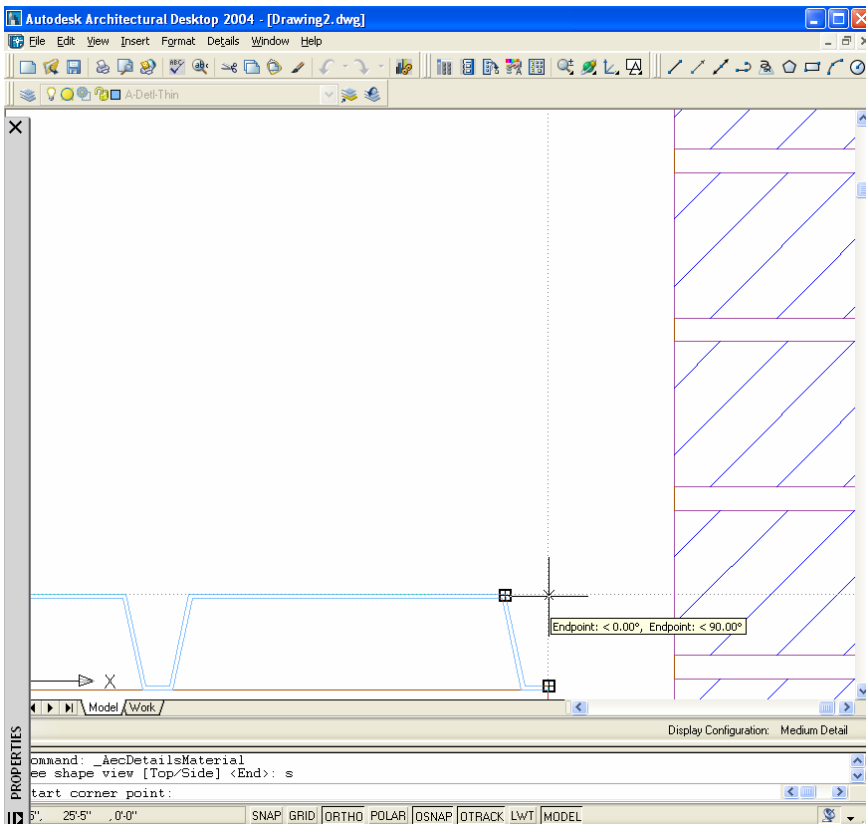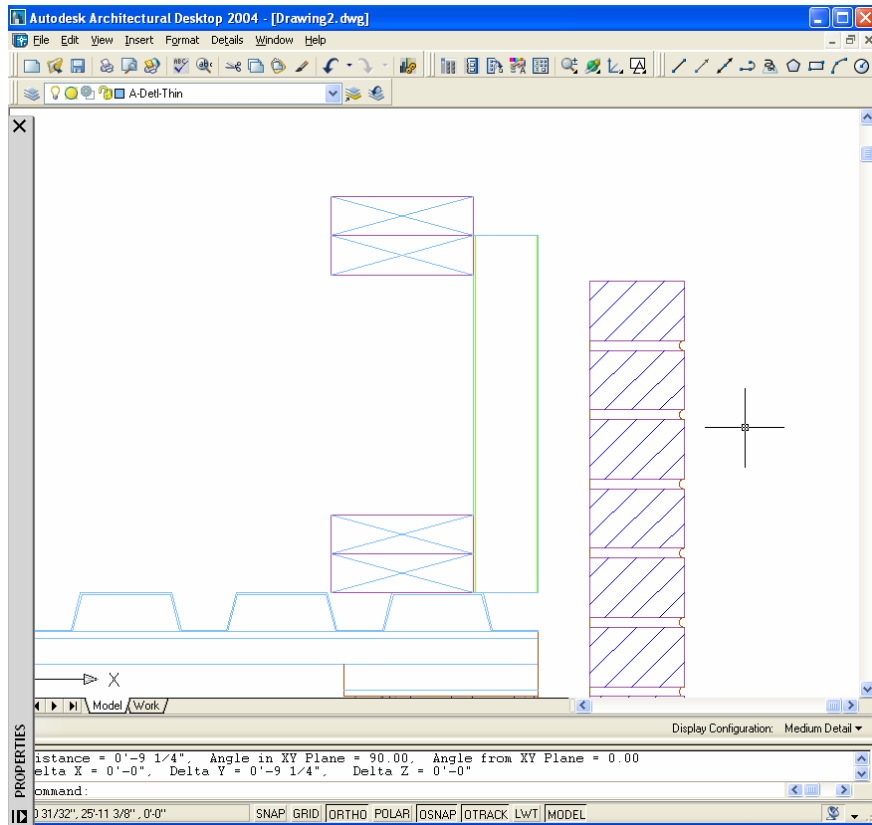

Figure 8

Now add wood blocking on the inside of the parapet. For lumber you have three choices on how it's drawn: lumber has an "X" in it, block has a slash, or plank has a wood hatch pattern. Start with a 2x6, placed at the bottom left hand side of the metal stud. After you place the block, use the "Y flip" option to flip it into position,

then use the copy option to make a copy three copies, one directly on top, the second and third at the top of the metal stud. After making the third copy (right on top of the second) use the "X flip" option to flip the copy down to match Figure 9.

Figure 9

To finish up the blocking, add a pair of 2x10's in the open gap. Use the top right side of the second block as the insertion point, and rotate the 2x10 into place, then make a copy of it to the left side and use "X flip" to set it into position (Figure 10).
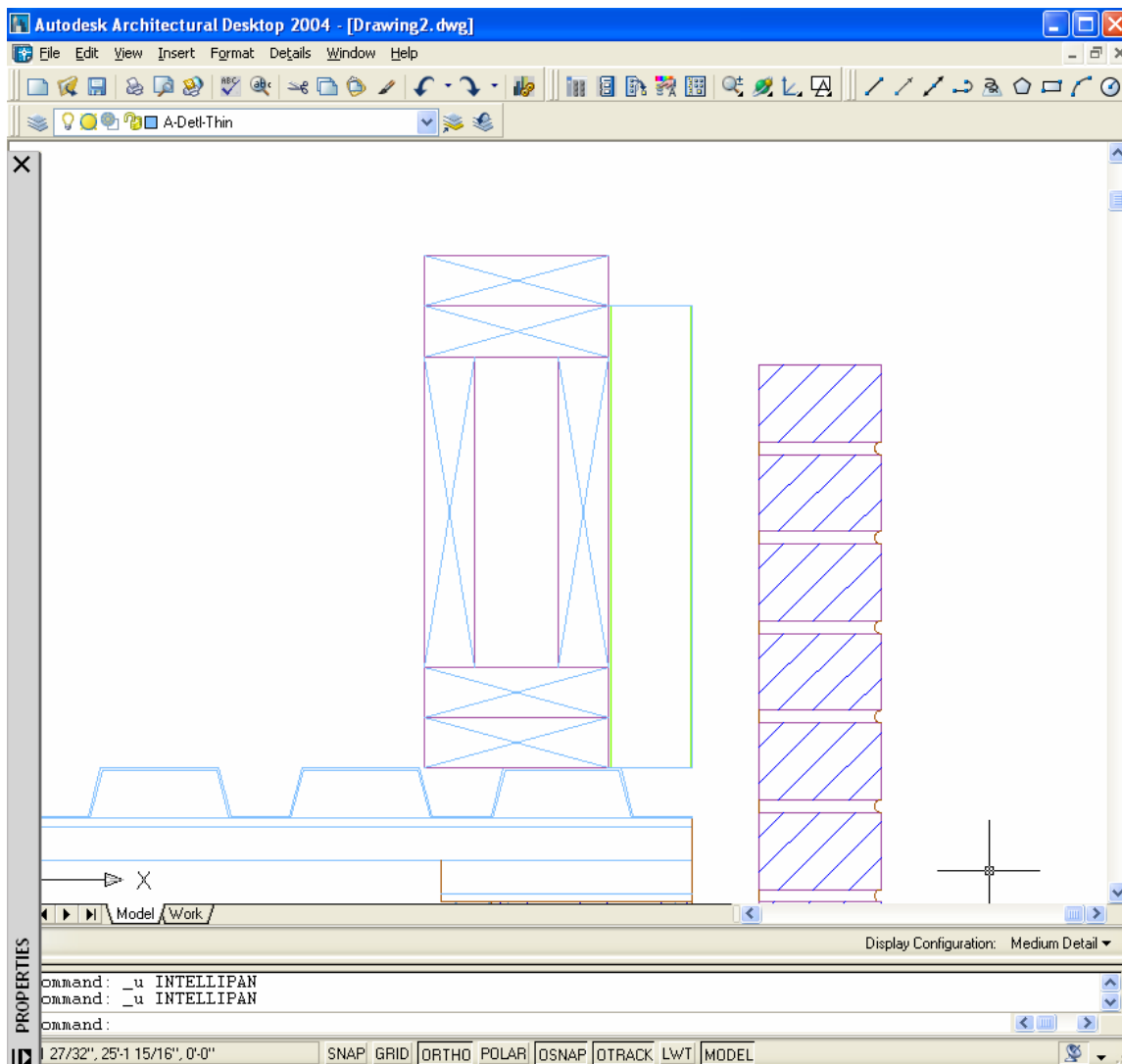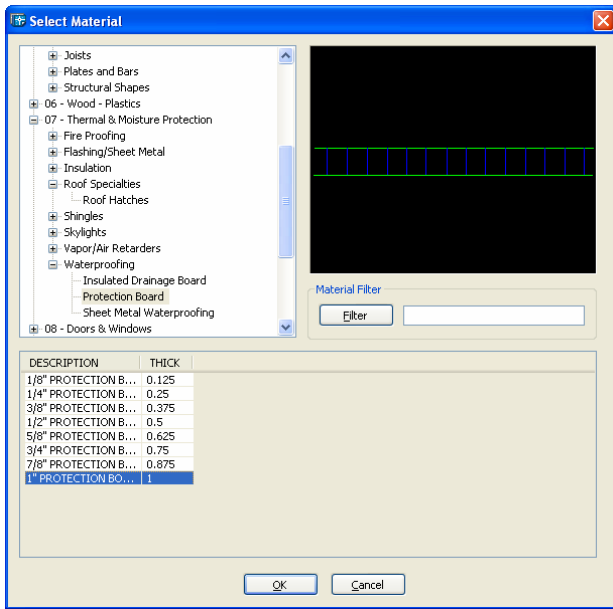
Figure 10

Roof Insulation

Now add a sandwich of 1" Protection Board (Figure 11) on top of the metal deck, 3" Rigid Insulation and 1" Protection board to top off the roof.

Figure 11

HINT: There are three different ways to draw the top piece of protection board. You can select it again from that material compose dialog and use the draw routine, you can draw a second piece at the same time you drew the first piece, starting it 3" above the first, or you could just use the AutoCAD "COPY" command to copy the outline and the hatch pattern.

When finished with the roof deck, your drawing should look like Figure 12.
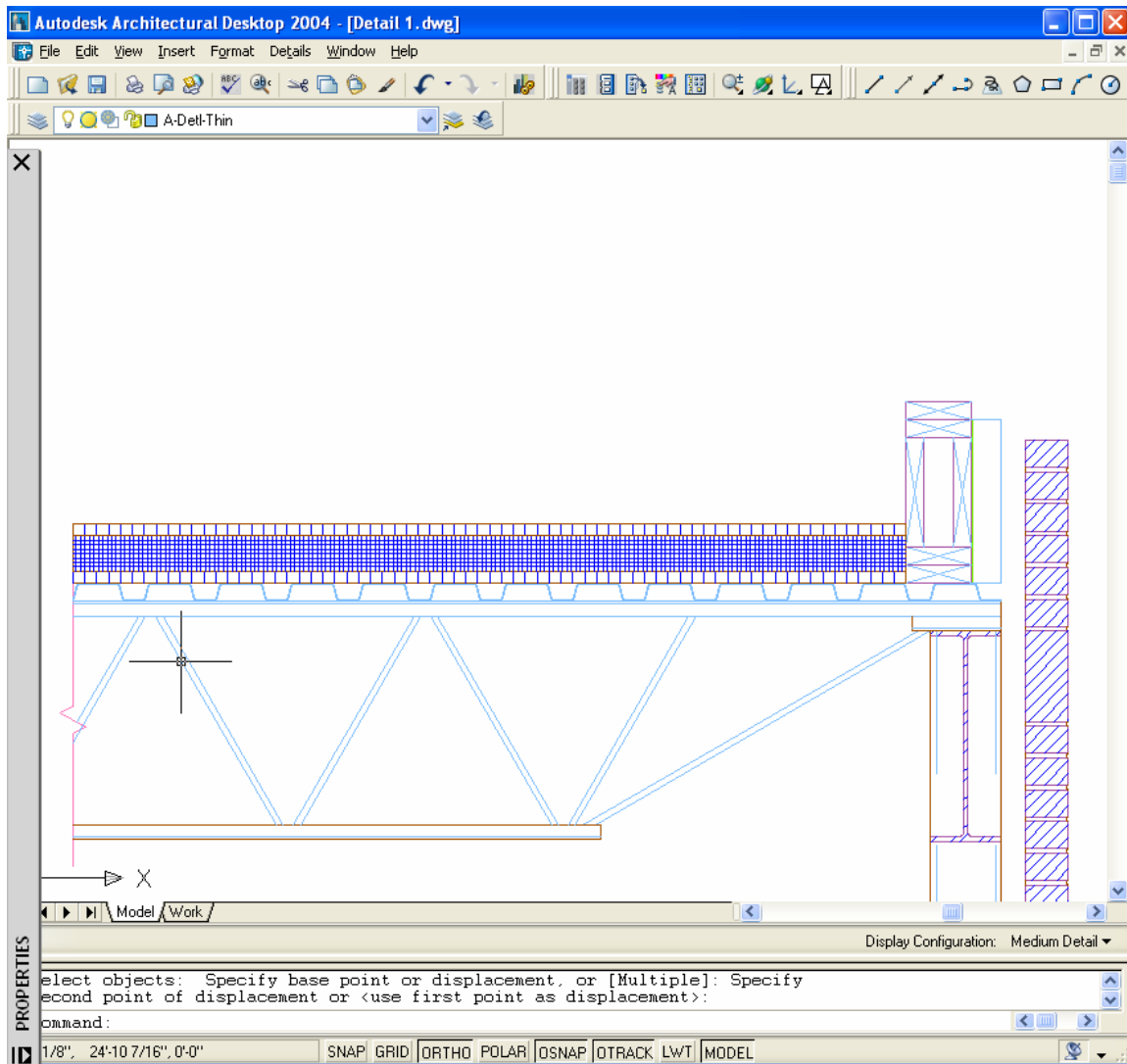
Figure 12

2x6 Cant Strip

Now we need to add a 2x6 cant strip between the roof deck and the parapet wall. Either use the Material Select dialog box to select a 2x6, or make a copy of one from the top of the parapet wall. We'll place on the roof, rotate into position, and then stretch it to from the bevels on the bottom.

Figure 13 shows the 2x6 first inserted in the drawing, with the bottom aligned with the top of the protection board.
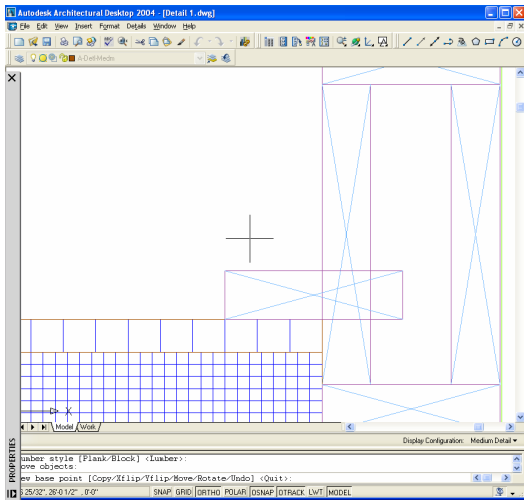
Figure 13

Figure 14 shows the 2x6 after an "X Flip".
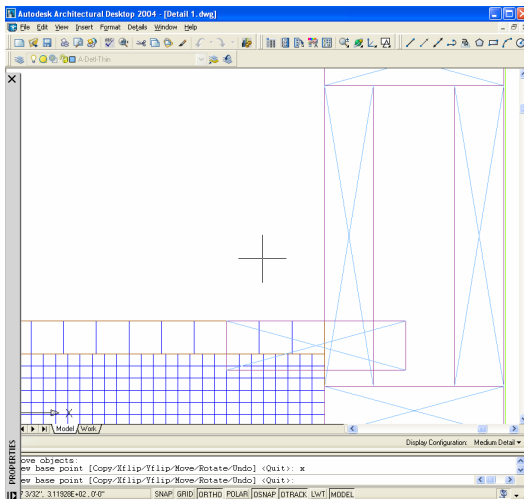
Figure 14

Figure 15 shows the 2x6 after using "Rotate" to rotate it 45˚.

Details: an Unsung Hero of Autodesk® Architectural Desktop
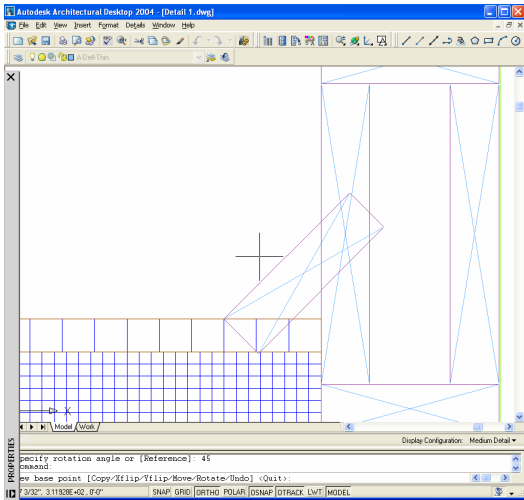
Figure 15

Figure 16 shows the 2x6 after moving the 2x6 so the top edge is even with the 2x10 that forms the parapet wall.

Figure 16

The final step is to use grips to stretch the outline and "X" to form the bevels necessary. When finished, the cant strip should look like Figure 17.
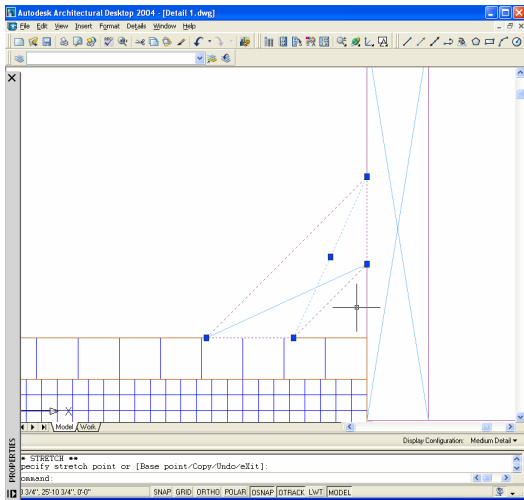
Figure 17

Drawing material using the "Specify" option

Some of the materials will allow you to enter overrides for the default sizes. In this example, we need a wood block on the top of the metal stud. The metal stud we used was 2 ½" wide, so we can either use a 2x3, or a 2x4 that we "rip" down to 2 ½". Choose a 2x4 from the material selection dialog box, at the first prompt choose "Specify". When prompted for the thickness, either enter 1 ½" or s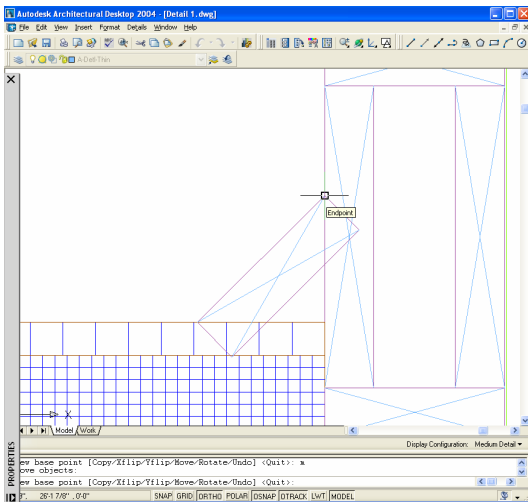elect the bottom and the top of a 2x6 in the drawing. When prompted for the width, either enter 2 ½" or select the left and right sides of the metal stud. Then add the 2x4 (cut to 2 ½") to the top of the metal stud. When finished, it should look like Figure 18.

```
Draw material by [Specify] <Default>: s

Lumber thickness: 1.5

Lumber width:   2.5

Lumber view [Thickness/Width] <Section>:
```
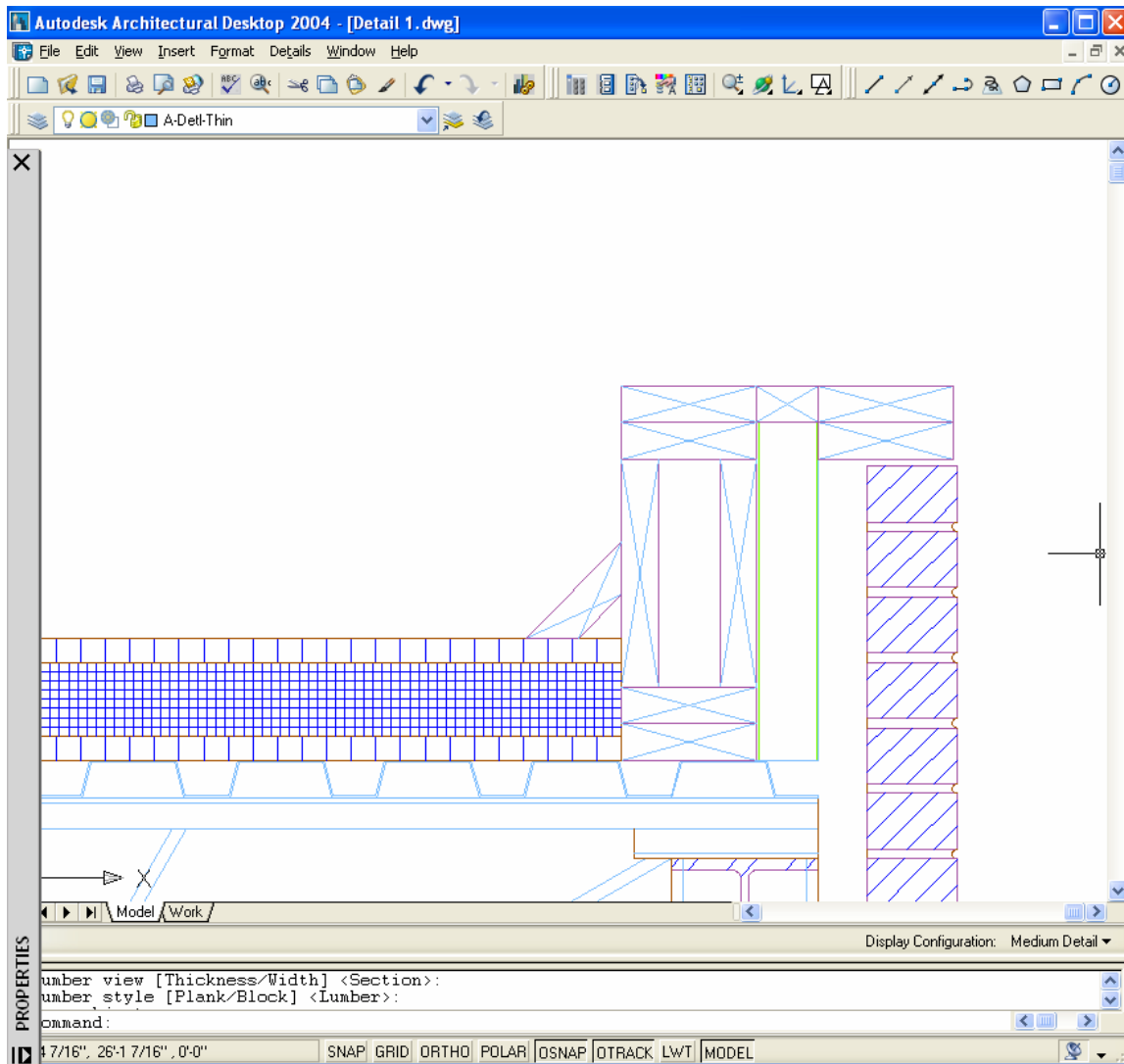
Figure 18

Additional Building Components

If you have time, you can complete the model, adding the built up roofing, the flashing cap, and the metal stud on the interior, the batt insulation and the gypsum wall board, as shown in the completed detail. If you don't have time, just open the file "Wall Detail Completed" on your workstation to complete the annotation portion of this exercise.

Annotation

Now that we have drawn the wall section, we need to annotate it. For this exercise the annotation will be done in Modelspace using the description of the materials from the database. The annotation command in Details uses the QLeader settings when adding the leaders. To annotate a detail component, select it and then right click and choose the "Annotate" option. It will prompt for the start point and end points of the leader, and then place the description of the material as it is in the material database (generally the first column of the table). This, like any other leader, can be edited by double clicking on the text.

Annotate the detail as shown in the final drawing. Note: While much of the annotation is taken directly from the database description, some has been embellished to provide additional information. For example, the 2x6 at the top of the parapet wall is called out as "2x6 BLOCKING"

One trick for annotation is to set a snap grid at a ¼" (plotted) and use that to snap the text into location. This way your annotation will align and be nicely spaced. If you do this, you will need to turn the snap off when selecting the materials and the first point of the leaders.

Plate Symbol

With the latest release of AutoCAD and Architectural Desktop Extension, a set of "symbols" have been added to the MText editor. After annotating the plate, we can go back and change the annotation to use a plate symbol. First, annotate the plate, using the normal annotation routine. Then, select the text and double click to bring up the Text Formatting dialog box. With your cursor at the start of the line right click and under "Symbol" select "Property Line" (PL), and finish editing the line to include the "(PAINTED)" note.

Welding Symbols

Another annotation tool in Details is welding symbols. Under the Details menu select "Welding Symbols" and select "New" at the command line. In the "Welding Symbols" dialog box, select a fillet weld on the "Arrow Side" with ¼" in the "S" field. Check the "All Around" option (Figure 19), and add the welding symbol, with a leader pointing to the plate.
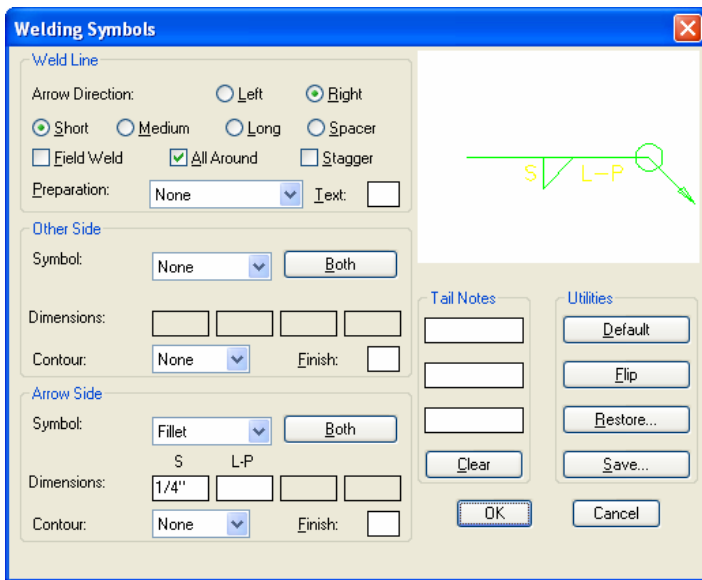
Figure 19

Setting up the layout tab

Now that the detail is finished, we can add a title block to it. This step is only necessary if you may want to print the detail out on a single sheet. (If you used a template that has a detail title block in it to start with, you wouldn't have to do this step.)

Open "Design Center" and go to the "Folders" tab and find the "Details Layout Template" on your machine, and open up the "Layouts" section. Double click on the "Detail" layout (Figure 20), and it will be added to your drawing, along with its plot configuration.

Details: an Unsung Hero of Autodesk® Architectural Desktop
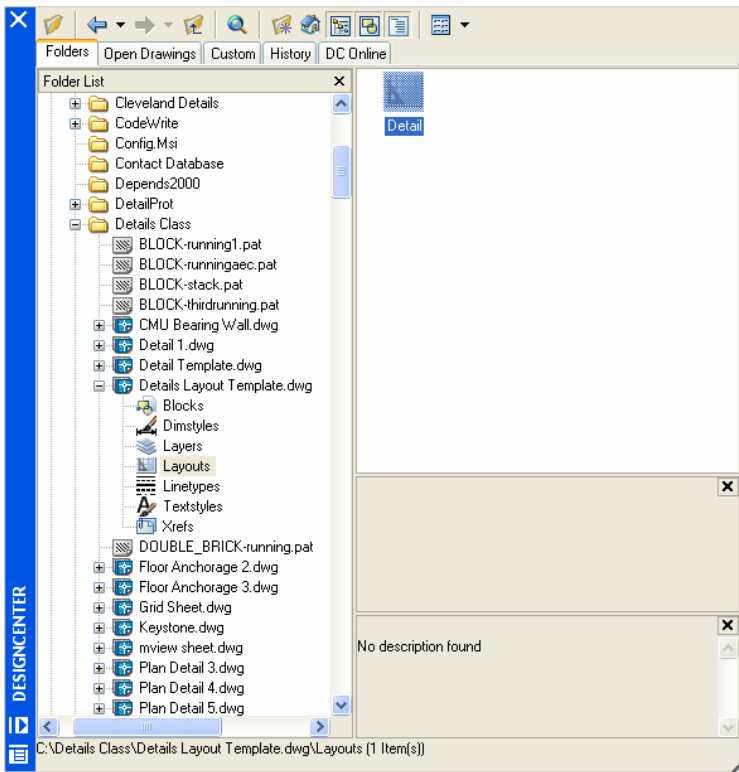
Figure 20

Back inside of AutoCAD, open the "Detail" layout tab, and verify that the detail is centered in the view. If not, double click inside of the view, and pan till the view is centered. Remember, if you zoom the drawing, then you will have to rescale the viewport back to 1"=1'-0". A simple way to do this is to look at the "Properties" of the viewport, and make sure that the "Standard Scale" is set correctly. Once the drawing is centered in the viewport, "Lock" the viewport so that it won't be changed accidentally.

The final detail is printed on the following page.
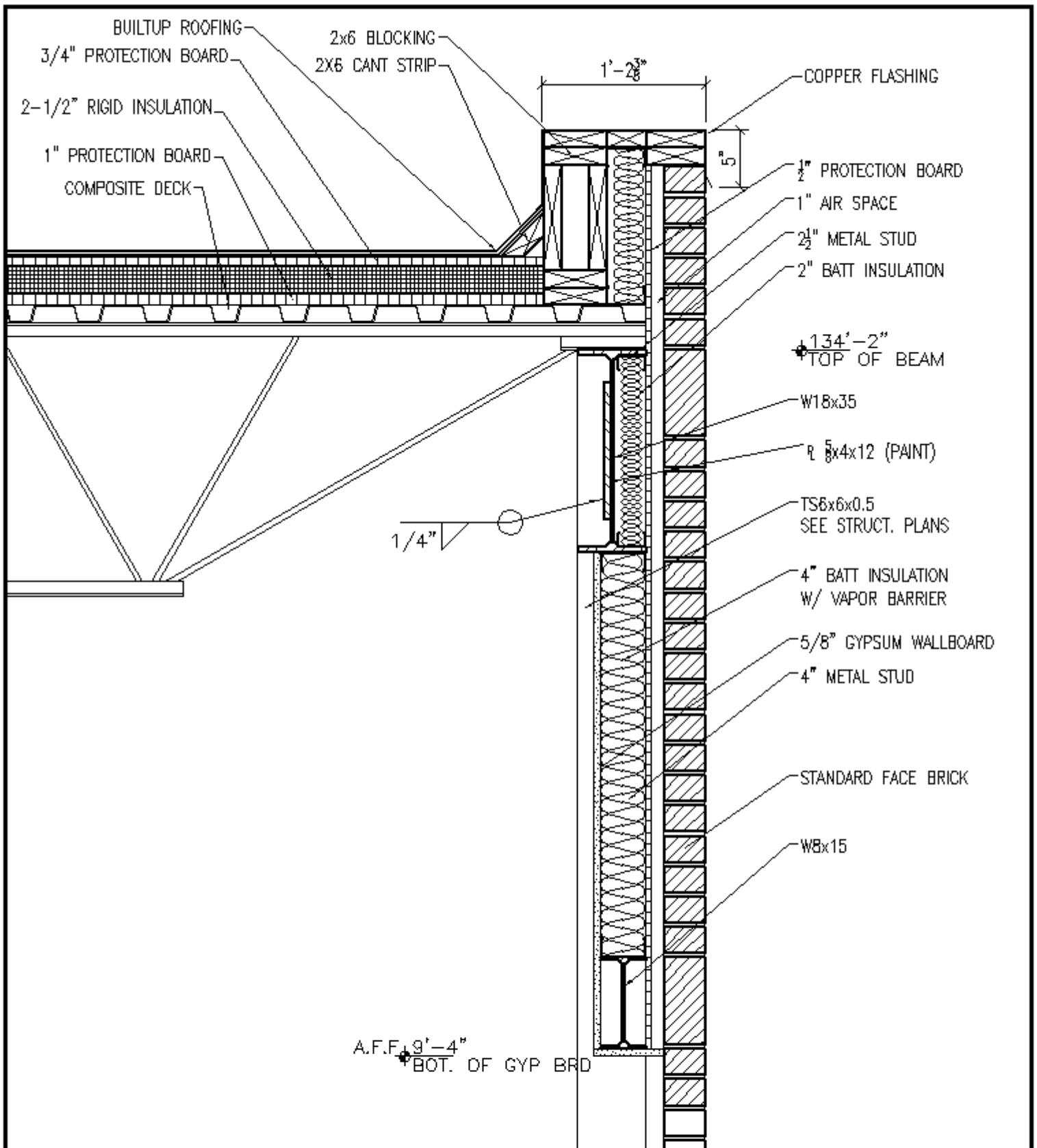
Autodesk University® 2003

BUILTUP ROOFING
3/4" PROTECTION BOARD
2-1/2" RIGID INSULATION
1" PROTECTION BOARD
COMPOSITE DECK

2x6 BLOCKING
2X6 CANT STRIP

1'-2 3/8"

COPPER FLASHING

5"

1/2" PROTECTION BOARD
1" AIR SPACE
2 1/2" METAL STUD
2" BATT INSULATION

+134'-2"
TOP OF BEAM

W18x35

L 5/8x4x12 (PAINT)

TS6x6x0.5
SEE STRUCT. PLANS

4" BATT INSULATION
W/ VAPOR BARRIER

5/8" GYPSUM WALLBOARD

4" METAL STUD

STANDARD FACE BRICK

W8x15

1/4"

A.F.F. 9'-4"
BOT. OF GYP BRD

Wall Section (Existing)

Project Number	BD42-2L	
Date	12/3/2003	A901
Drawn by	plf	
Checked by		1" = 1'-0"

Editing the material database

As you make details, you'll find gaps in the current material database. Let's look at a two ways to fill those gaps in. In both cases, Microsoft Access is currently required to edit the database.

Adding new sizes to a table

The first way is to add new sizes to an existing database table. This is used for materials that can come in a variety of different sizes, like concrete walls or if you have a custom size for a common component, like a brick.

Use "File Explorer" to find the database file: "C:\Documents and Settings\All Users\Application Data\Autodesk\Autodesk Architectural Desktop 2004\R16.0\enu\Support\AecDetails\AecMaterials.mdb" once you find it, make a "Shortcut" to it, and place the short cut on the desktop. This way you'll never have to hunt for it again!

NOTE: Inside Details, you can change the location of the database to use a central file for the office. This file can either be locked or un-locked.

Open the database file. With the database open you'll see all the material tables that make up Details. The table names start with the material division numbers. Open the table "03-CONCWALL". You should see two records. We are going to add a couple of new wall thickness, 14" and 24" with corresponding descriptions to match (Figure 21)
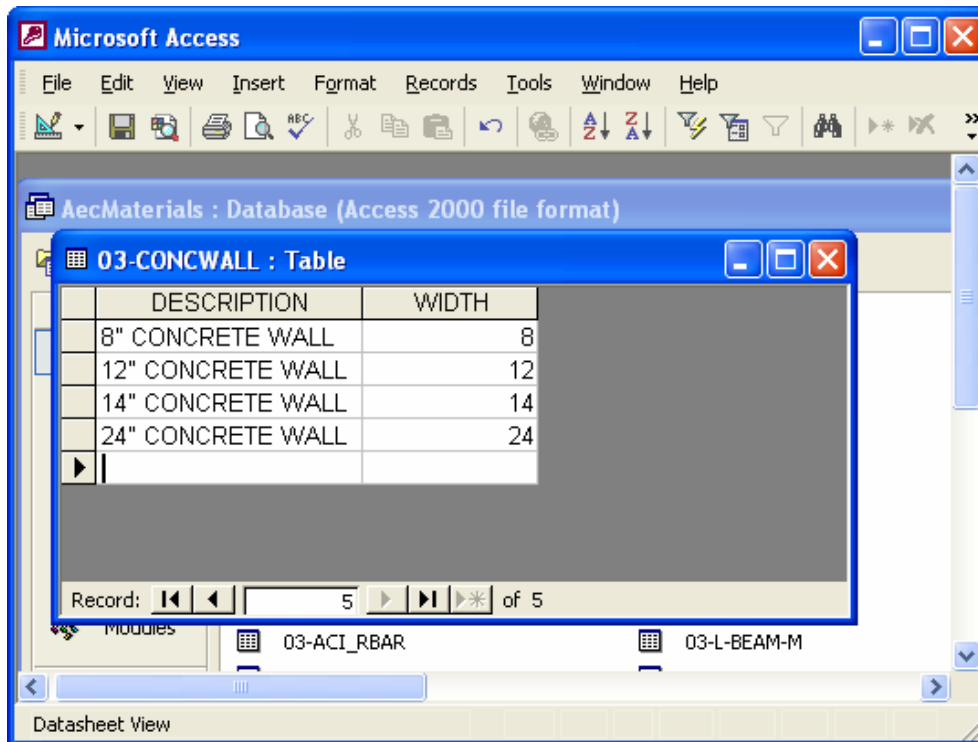

Figure 21

Because Access saves the database every time you move to a new row, you can leave the table open and go back into Architectural Desktop and use the new wall thicknesses (Figure 22).
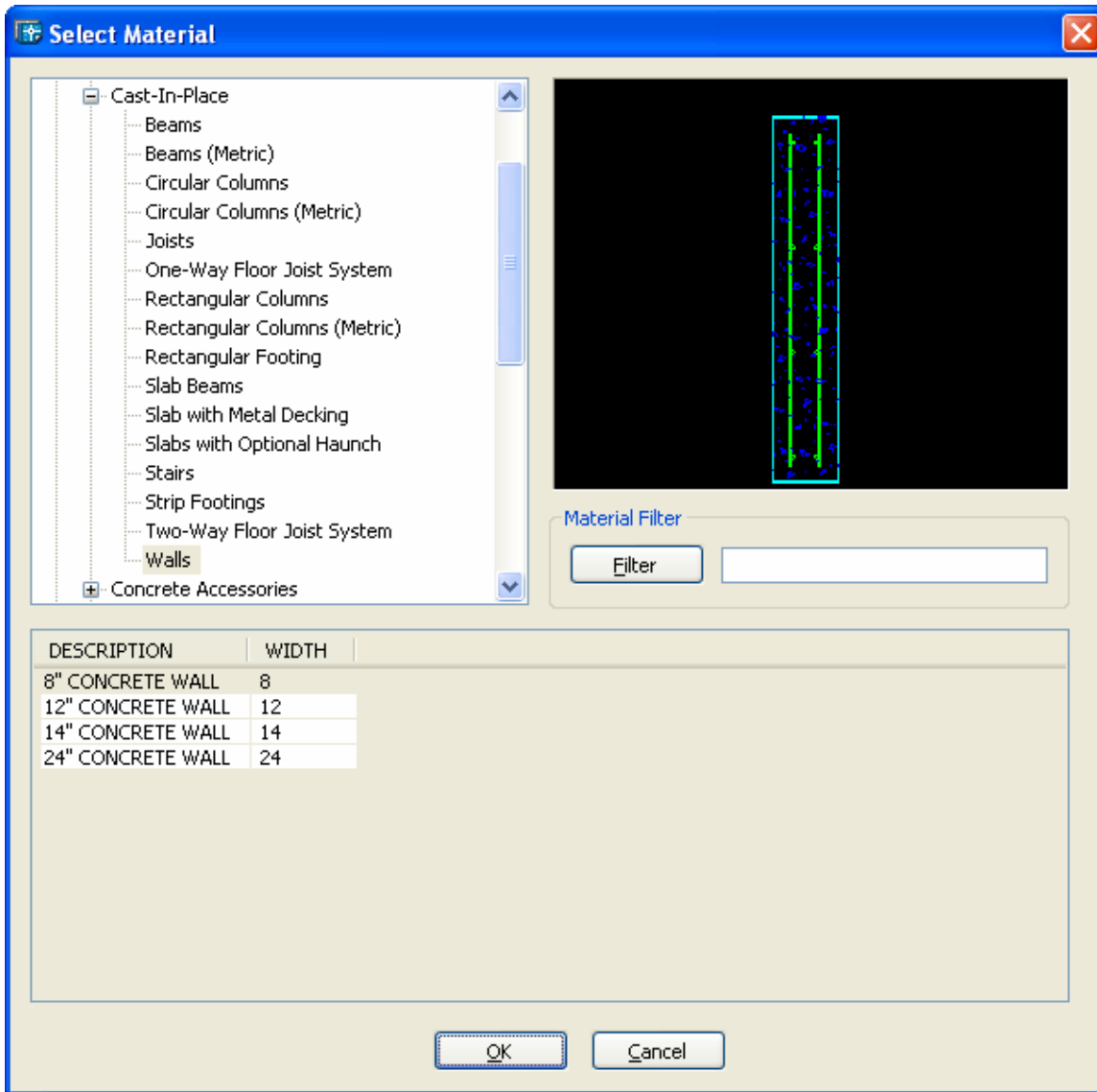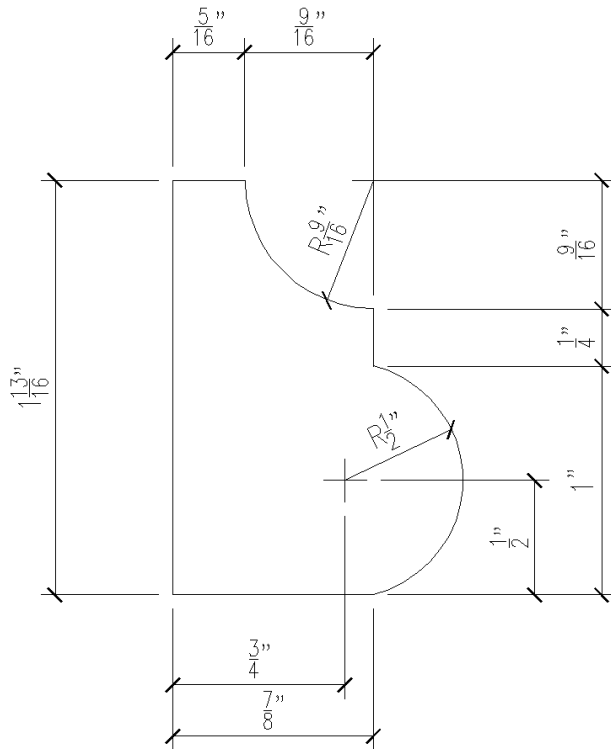
Figure 22

Adding new materials to the database with blocks

Much of the content that makes up Details is block based, that is AutoCAD blocks are inserted into the drawing, and the Details data is attached to them for use in annotation. Because there is nothing special about these blocks, making new blocks and adding them to the system is also very easy. Draw the block at full size and save it to the "dwg" directory of the division you want the material in and add a record to the correct table in the database.

We are going to add a new molding profile to the millwork division, and then use it in a new detail drawing. The first thing to do is to make a new drawing, using "*acad.dwt*" as the template, and set the scale of that drawing to 1 1/2"=1'-0". Because we can't adjust the hatch pattern density of a block after it's inserted, we need to decide before hand the "best" scale to draw this block at. We used the acad.dwt template file so that we wouldn't have any extra layers in it.

Next draw the outline of the profile, with 0,0 (the insertion point of the block) at the lower left-hand corner of the molding. When compete, the drawing should look like Figure 23, (less the dimensions).

Figure 23

With the outline complete, add a wood hatch pattern. For a cross section like this, I like to use one of the following hatch patterns: "WOOD_2", "WOOD_3" or "WOOD_4", with a scale factor of 1.

The final step to prepare the drawing file is to make two layers; name the first one "THIN" and set its color to 151 for the outline, name the second "HATCH" and set its color to 170 for the hatch pattern. With the layers named using layer keys like this, when the block is inserted in to a drawing with Details, the layers will be remapped to the current layering standard. The layer keys that Details uses are: FINE, THIN, MED, WIDE and HATCH.

With the molding complete, save the drawing to the *"C:\Program Files\Autodesk Architectural Desktop 2004\AecDetails\Wood\DWG"* directory, with the filename as *"Basecap1.dwg"*.

The final step is to add this molding to millwork table in the Details database. You should still have the material database open, if not re-open it, and open up the "06-Millwork" table. This table has two columns, one DESCRIPTION and the other "R_BLOCK" (reserved block name). Add a new row at the bottom of the table with description of "1-13/16 Base Cap Molding" and a block name of "basecap1" (Figure 24).
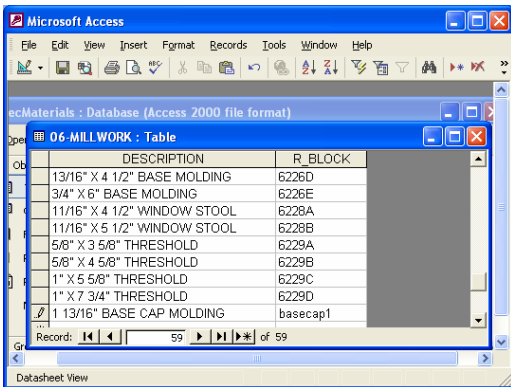
Figure 24

With the database edit complete, we can get back into Architectural Desktop, and open up the "Select Material" dialog. Open up the 06 – Wood – Plastics division, and under Finish Carpentry you will find Millwork. At the bottom of the table should be the new record that we just added, with a picture of the block as well (Figure 25). Select the new record, and press "OK" to add the base cap molding to your drawing.
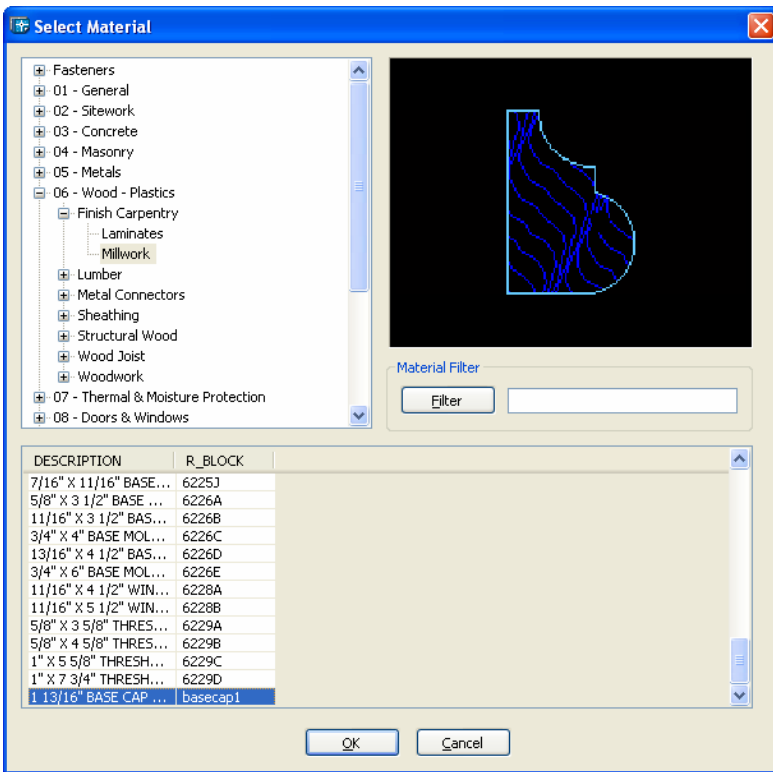

Figure 25

Generate a detail library

Most offices have a bunch of standard details, can't really call them a library because of a lack of organization. Details are reused, but typically only by the teams that drew them in the first place. Using Details can be your first step towards a detail library, because of two key features: a

consistent look and feel of the graphics and consistent annotation. The look and feel of the graphics is consistent because Details does most of the drawing for you. Layers and colors are controlled by the office layering standard using just 5 Architectural Desktop layer keys: FINE, THIN, MED, WIDE and HATCH. The hatch will also be uniform across all drawings done with details regardless of their scale factor. The hatch pattern and scale used by Details is controlled by the "*Hatches*" table in the material database, and was designed to allow you to modify it. Annotation is kept consistent three ways; the leader and text layers are controlled by the layering standard, the size is controlled by the drawing scale, and the text is either taken from the material database or from a keynotes database.

The use of the additional 8 ½ x 11" plot layout for each of the details is designed to provide a easy way to make a book of standard details. When you print out each of these sheets, be sure to note where the detail can be found.

As you name your details drawings, don't make your drawing file names fit into 8 characters. Use a descriptive name for the detail, and perhaps even include the scale that the detail is in. This way it will be easier to find details in the future. Also, when browsing for details, turn on "Thumbnails" in your browser so you have an idea of what the details look like.

There are also a number of independent developers who have made of add on packages for creation of and cataloging of detail libraries. Here are a two to check out http://www.easy-d.com and http://www.archmedia.net/html/autolib.html.

Tips and tricks

Here are a few tips and tricks that I use when drawing details:

AutoCAD

- When possible, center your detail on 0,0. This will make it easier later when inserting the detail into other drawings. If that's not possible, set the INSBASE (insertion base point) at the center of the detail.

- When scaling a viewport, use the "Standard Scale" drop-down list in "Properties" to set the scale quickly and accurately.

- After scaling a viewport and centering the detail, make sure you "Lock" the viewport so that the detail won't move and the scale won't be changed.

- When clipping an XREF, set "Frames" ON to show the frame around the XRef. This also gives you something else to select the XRef by.

- If you XRef you details into onto a sheet, use "Open XRef" to edit the detail.

Design Center

- Using Design Center to pull details out on to another sheet. In "Design Center" open up the drawing that has the detail that you want in it, then open the "Blocks" section of the drawing. Select the block that you want, and drag it into your new drawing.

- Grab layouts from existing drawings or templates to add to your new drawing. In "Design Center" open the drawing or template that has the layout that you want. In that drawing, open the "Layouts" section and select the layout that you want. If you just double click on the layout, it will be added directly to your current drawing. Note: this won't work if the layout you want is named "Layout1".

Detail Libraries

- Use descriptive filenames for your details.

- Organize your details into folders by type of details.

Menu file listing the editing tools

When Details was ported from Architectural Desktop 3.3 to 2004, a few of the key editing features were dropped from the menu. Here is a listing of a partial menu that contains those commands that can be added to your menu file.

```
[Hide Material      ]^c^c^p(zz_load "ZM" "hidematl" zm_hidematl nil nil)(zm_hidematl)
[Trim Material      ]^c^c^p(zm_trim)
[Cut / Cope Steel   ]^c^c^p(zz_load "ZM_METAL" "cuts" cuts nil nil)(zm_cuts)
[Concrete Keyways   ]^c^c^p(zz_load "ZM_CONC" "keyway" keyway zz#t nil)(keyway "KEYWAY")
[Round Hole         ]^c^c^p(zz_load "ZM_FAST" "hole" hole nil nil)(hole)
[Slot               ]^c^c^p(zz_load "ZM_FAST" "slot" slot nil nil)(slot "HOLE")
[Ellipse            ]^c^c^p(zz_load "ZM_FAST" "ellipse" ellipse nil nil)(ellipse)
[Edge View of Hole ]^c^c^p(zz_load "ZM_FAST" "flg_hole" zm_flg_hole nil nil)(zm_flg_hole)
```

Scaling Details

How could I have a class that didn't include a little code? Here is a little routine that will scale a detail from one scale to another. The big thing here is the scaling of all the hatch patterns.

```
' (C) Copyright 2002-2003 Autodesk, Inc. All rights reserved.
'
' Permission to use, copy, modify, and distribute this software in
' object code form for any purpose and without fee is hereby granted,
' provided that the above copyright notice appears in all copies and
' that both that copyright notice and the limited warranty and
' restricted rights notice below appear in all supporting
' documentation.
'
' AUTODESK PROVIDES THIS PROGRAM "AS IS" AND WITH ALL FAULTS.
' AUTODESK SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF
' MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE.  AUTODESK, INC.
' DOES NOT WARRANT THAT THE OPERATION OF THE PROGRAM WILL BE
' UNINTERRUPTED OR ERROR FREE.
'
' Use, duplication, or disclosure by the U.S. Government is subject to
' restrictions set forth in FAR 52.227-19 (Commercial Computer
' Software - Restricted Rights) and DFAR 252.227-7013(c)(1)(ii)
' (Rights in Technical Data and Computer Software), as applicable.

Public Sub ScaleDetail ()
    Dim obj As AcadObject
    Dim oHatch As AcadHatch
    Dim oMtext As AcadMText
    Dim oDim As AcadDimension
    Dim dScale As Double
    Dim dNewScale As Double
    Dim dLineSpace As Double
    Dim dOldScale As Double
    Dim dbPref As AecArchBaseDatabasePreferences
    Set dbPref = AecArchBaseApplication.ActiveDocument.Preferences
    dNewScale = ThisDrawing.Utility.GetReal("New dimension scale factor: ")
    dScale = dNewScale / dbPref.DatabaseScale
    dbPref.DatabaseScale = dNewScale
    For Each obj In ThisDrawing.ModelSpace
        If TypeOf obj Is AcadHatch Then
            Set oHatch = obj
            oHatch.PatternScale = oHatch.PatternScale * dScale
        ElseIf TypeOf obj Is AcadMText Then
            Set oMtext = obj
            dLineSpace = oMtext.LineSpacingFactor
            oMtext.LineSpacingDistance = oMtext.LineSpacingDistance * dScale
            oMtext.Height = oMtext.Height * dScale
            oMtext.LineSpacingFactor = dLineSpace
        ElseIf TypeOf obj Is AcadDimension Then
            Set oDim = obj
            oDim.ScaleFactor = oDim.ScaleFactor * dScale
        End If
    Next
End Sub
```