

# Autodesk Architectural Desktop™ 2007

## Feature Based Primer for Basic and Intermediate Classes Part 3a of 4 = Objects

(ok now there are 5 total parts part 3 is in 2 parts a and b)

...or...

## David's Brain Noise for ADT 2007

Have I said yet,

Use the right mouse button

or

Watch the command line

?

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# Building Objects

This section covers the objects found in a building such as walls, doors and the table with the computer on it. I do this because although there are some wide variations in many aspects of these objects, there are also some similarities in how they are added to the drawing, how they are controlled once in the drawing, and how their displays are controlled to get the final print to look like you want it.

## Basic Building Objects:

- Walls:
- Doors and Windows
- Stairs and Railings
- Roofs
- Curtain Walls
- Curtain Wall Units
- Spaces and Space Boundaries
- Structural Elements

## Intermediate/Advanced Objects:

- Curtain Walls and Door/Window Assemblies
- Mass Elements, Groups and Camera
- Profiles
- Slabs and Edges for Roof and Floor
- Areas and Area Groups
- Walls – Sweeps, Body Modifiers and Endcaps

In this section, for each object: I break the subject matter objects down into four main categories of brain noise;

- Basics --- Adding ---Modifying ---Etcetera

The Basic section covers general thoughts and ideas about the object and includes a screen cap of the properties page, any tabs of the style sheet I think might be useful to point out, along with a couple screen caps of display representations that are may be unique for that object.

In the Adding section, I discuss any parcularities of the object in how it may be added or any cautions I have run across about doing the same.

In the modifying section I break down into ACAD modify (grips, fillet trim etc.) and the Right Click tools unique to the object in question. Because you are working with ACAD, most ACAD commands work on all AECobjects. Some of this is common:

Copy, paste etc.

Ctrl-left drag to copy any object

Right drag into new drawing while screen shows two open drawings

Some of it differs from object to object

Curtain walls will trim and break, but not fillet.

Almost all the objects have different grip controls according to the needs/characteristics of the objects.

The final section called Etcetera holds any thoughts that do not fit into the above categories

Once again, these sections are not complete documentation by any means for the objects. The information I record here is mostly for you to use as a reference in the early phase of your learning curve. It also keeps me on track in the basic and intermediate class.

# Walls, Walls, Walls and more walls

## Basics

Know your walls, they are the crux of the production, everything else is icing on the cake. I have not really noted much here for the walls because we spend so much time on them in class.

## Properties

### Style

Has components, endcaps, and display props  
“defaults” tab from R3 has moved to tool properties

### Display

## Adding

### Tool, RightClick > Apply to:

Can convert plines/lines to walls – or can be used to “match Props”

### Pick points

Watch the autosnap to baseline setting in the options.

### Other

## Modifying

### ACAD modifying

Grips: Watch the autosnap to baseline setting in the options.  
Middle square grip will move entire wall, - any attached walls will extend to the new location  
Triangular end grip stretches wall in line – no change in angle of wall  
Square end grips can pull wall out of plane (rotate).

ACAD commands Trim, Fillet, Break, Extend etc all work with walls

## RightClick Tools

### Modifiers

Modifiers = basic pier, nitch. Create as polyline and convert or, draw in place. Watch the Command line!  
When creating from polyline make sure the start and end point of the polyline are on the component you are adding the shape to.  
General Rule, keep your modifiers from crossing wall components with higher priorities – this will show the red circle of death.  
To remove a modifier – go to the modifier worksheet on the properties page for the wall. – you can also adjust various things like height in this worksheet.  
Modifiers can also be edited in place

### Interference

Interference (will only be subtractive in model view, but can be subtractive in plan – only operates on shrinkwrap, so if shrinkwrap is not turned on in the style, you will not see interference conditions

## Body Modifiers,

make mass element, make bodymodifier – erase mass

## Sweeps

Sweeps are an exception to the profile rules – insertion point is specific

Sweeps will replace a component entirely with the geometry of the profile – if you need to change size of swept component, redefine the profile.

outer sweep profiles drawn looking left (exterior brick mold etc), inner sweep profiles drawn pointing right (chair rail, crown mold etc).

## Roof line/floor line

(P to Project to polyline, A to Autoproject to AEC object, R to reset – or edit in place)

## Etcetera

Anatomy	Components
	Vertical data points: Floor line Baseline Base Height Roof line
Cleanup	Behavior Walls will attempt to clean up if the <b>graph lines</b> touch or cross. Walls will attempt to clean up if the <b>Cleanup radius over ride</b> of one wall touches or crosses the graph line of another wall.
	Wall Cleanup Groups
Endcaps	Wall endcap styles Opening endcap styles See section that follows
Modifiers	Plan Modifiers Draw a polyline and convert it to a modifier (niche or pilaster) Right click to edit in place Do not try to force modifiers of a component with a higher priority (lower number) through component of a lower priority  Body Modifiers – create a mass element or group. Replace, add to or subtract from a single component in the wall.
Interference	

## Wall Component Index

for all wall styles provided with the software.

Concrete 200

Concrete (Footing) 200

CMU 300

CMU Veneer 350

Precast Panel 400

Stud 500

Insulation 600 (CMU/Brick, Stud/Brick)

Rigid Insulation 804 (Brick)	
Air Gap 700	
Air Gap (Brick Brick)	805
Air Gap (CMU CMU)	305
Air Gap (Stud Stud)	505
Brick	800
Brick Veneer	810
Siding	900
Metal Panel	1000
Stucco	1100
Glass	1200
GWB	1200
GWB (X)	1200,1210,1220,1230
Bulkhead	1800
Casework - Base	2010
Casework - Upper	2000
Casework - Counter	2020
Casework - Backsplash	2030
Toilet Partition	3000

## Wall Endcaps

### Wall EndCaps Rules - Single component walls

#### End caps General rules –

When all else fails (or even before failure), recreate the condition by drawing the walls from left to right and go from there, drawing an endcap for the right end of the wall. This eliminates as many variables as possible.

#### Rules....

Polylines for end caps must be drawn counter clockwise.

The Start and End point of the polylines must be co planar (aligned along the Y axis)

The start and end points should be the same width apart as the wall you are going to apply it to, otherwise the endcap will be scaled to match the wall. Corollary: it is next to impossible to create one end cap for walls that have a variable width, unless all you are doing is creating a single element polylines and using an Offset

Positive offsets will push the endcap into the wall (subtract from the length of the wall)

Negative offsets will increase the length of the wall

Think about a wall drawn from left to right, the positive/negative will be at the Origin of the wall,

Negative is negative in the X direction, so the wall gets bigger. Go figure.

#### Multiple component walls:

##### Everything above applies.

Before creating an endcap for a multiple component wall, look at the wall style and find out how many components it has and keep in your mind or write down which components are which. You will be using the index numbers when you create the endcap, so you need to understand how the wall style is constructed before you create an endcap for it.

##### One polyline per component.

You may create a single polyline and apply it to a single component of a multiple component wall.

Alternatively, you can create multiple polylines. Each polyline will be assigned to a specific component.

#### Endcaps to solve Cleanups

## Building Objects

Just as sometimes there is no other way to clean up two walls other than making a special endcap for the situation at hand, so too are there situations where eliminating all the endcaps is the only option for cleaning up a wall intersection.

### Other notes:

Endcaps may be applied by the wall style.

Endcaps may be applied to an individual wall in the Wall Properties dialog box.

Endcaps may be overridden at each end using the plan tools>override endcap

Look at the samples that come with the sample wall styles, they will give you an idea of how to create the polylines for special conditions. You can 'insert endcap as polyline' to dissect an endcap style.

Of course this is much simpler in 2004/5, just draw a pline, select the wall, RC>Endcaps>Calculate automatically

## Opening Endcap Styles

wall endcaps are 3D for openings, as well as they are nested.

Start with a basic endcap knowledge, and then you can create endcaps for each of the 4 sides of a window. Once the 4 endcaps are made (if different you will have 4, you gather them together in a Wall Opening Endcap Style to assign to the wall style).

Remember to turn on the 3D endcap in the Model representation of the wall style or drawing default if you want to see them...

## Workaround for projecting wall to stair

Solution: The auto-project option of the Roof Line routine only holds in memory the current object to which the wall is projected. If the object selected as the projection point contains varying heights, the results are not as expected. Use the following procedure to avoid this problem:

This procedure is also needed to raise the top of a curved wall to a curved stair.

- 1) Use the *BREAK* command to segment the wall object into multiple sections with a length equal to each depth of each step in the stair run.
- 2) From the Design menu, choose Walls > Wall Tools > Roof Line.
- 3) On the command line, type a for the Auto-Project option and press ENTER.
- 4) Select each of the segmented wall objects when prompted to Select walls and press ENTER.
- 5) Select the stair object when prompted to Select entities and press ENTER twice.
- 6) From the Design menu, choose Walls > Wall Tools > Join Walls.
- 7) Select one of the wall objects when prompted to Select first wall.
- 8) Select an adjacent wall object when prompted to Select second wall.
- 9) Repeat steps 7 and 8 as many times as necessary to join each of the segmented wall objects into a single wall object.

# Doors, Windows and Openings

## Basics

### Properties

Properties are mostly about size, head height, sill height, etc

Width/height of doors are measured to the inside of the frame and windows to the outside of frame (by default) – this is set in the properties page of tool or object (use to be in options R1-3)

### Style

Most variables held in style (how the door /window /opening will be built in the real world)

Door and window styles have the same control

Dimension tab controls frame, stop and width

Third tab controls shape and type – Use Profiles for custom shapes of doors, windows or openings.

Void in profile will automatically be calculated as glass in door, solid in window or opening

Display Representations	Display Property Source	Style Override
Elevation	Drawing Default	<input type="checkbox"/>
Model	Drawing Default	<input type="checkbox"/>
Model High Detail	Drawing Default	<input type="checkbox"/>
Model Low Detail	Drawing Default	<input type="checkbox"/>
Nominal	Drawing Default	<input type="checkbox"/>
<b>Plan</b>	<b>Drawing Default</b>	<input type="checkbox"/>
Plan High Detail	Drawing Default	<input type="checkbox"/>
Plan Low Detail	Drawing Default	<input type="checkbox"/>
Plan Screened	Drawing Default	<input type="checkbox"/>
Reflected	Drawing Default	<input type="checkbox"/>
Reflected Screened	Drawing Default	<input type="checkbox"/>
<b>Sill Plan</b>	<b>Drawing Default</b>	<input type="checkbox"/>
Sill Plan Screened	Drawing Default	<input type="checkbox"/>

### Display

Doors and windows have Elevation and Sill Representations in addition to others

Display Component	Visible	By Material	Layer	Color
Door Panel	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Frame	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Stop	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Swing	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Direction	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Door Panel Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ 31
Frame Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ 31
Stop Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ 31
Swing Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ 31
Door Panel Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Frame Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Stop Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK
Swing Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	■ BYBLOCK

## Display Rep Plan

2004 added quite a few components to the plan rep. This allows you a lot more control in RCP's and when the wall is in a curtain wall or assembly

Display Component	Visible	By
Threshold A	<input type="checkbox"/>	<input type="checkbox"/>
Threshold B	<input type="checkbox"/>	<input type="checkbox"/>
Threshold A Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>
Threshold B Above Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>
Threshold A Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>
Threshold B Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>

Threshold Dimensions  
 A - Extension: 0"  
 B - Depth: 0"  
 C - Extension: 0"  
 D - Depth: 0"

Respect Cut Plane of Container Object when Anchored.

## Display Rep Threshold

Although the Threshold representation is active (turned on) for many on the plan display configs, interestingly the objects in the rep are turned off by default.

Just turn on the components to see the sill in plan

Display Component	Visible	By Material	Layer
Frame	<input type="checkbox"/>	<input type="checkbox"/>	0
Sash	<input type="checkbox"/>	<input type="checkbox"/>	0
Glass	<input type="checkbox"/>	<input type="checkbox"/>	0
Swing	<input type="checkbox"/>	<input type="checkbox"/>	0

## Display Rep Elevation

Note the elevation rep is completely separate from the model rep.

The Elevation representation is used in the sections and elevations.

## Adding

### Tool, RightClick > Apply to:

Existing door only (match props of existing door to tool properties)

### Pick points

Pick a wall, pick a point to place the door/window/opening

If you press Enter before selecting a wall it will just place door in the drawing without anchoring it to anything

Add Property Settings/ Default tool props: Watch the setting Position Along Wall on the properties. Unconstrained lets you add anywhere in the wall, Offset/Center just sticks to the values you enter there.

Specific distance: Once wall is picked, but before placement, use the tab key to cycle through the dimension values that appear after you pick the wall. Type in value needed.

### Other

Wall, Select, RC>Insert>door

Add selected works for doors and windows (select one in the drawing, Right Click > Add selected).

This is useful for adding in windows you have customized the location of (within the wall) or layer of (will put new door/window on same layer)

### Modifying

#### ACAD modifying

Three grips  
Triangles at bottom change width of door, triangle at top changes height  
Square moves door as is  
Arrows flip door.

#### RightClick Tools

##### Add profile or edit profile in place

Add a profile or edit it in place is that not clear?  
The profile is used in the style of the door to determine its shape as well as if there is glass in it or not.  
– refer to the door shape in its style

##### Reposition along wall

Select inside frame or center of door  
Select point to measure from  
Type in distance between those to points

##### Reposition within wall

Select outside of frame or center of door  
Select point to measure to (perp to wall)  
Enter distance on keyboard

### Etcetera

#### Muntins

Located in the elevation and model display properties you will find a muntins tab.  
Windows had Muntins in R3, new to 2004/5, doors have muntins, but the interface is a bit wonky. – you may not get a preview image, but the muntins will be applied if the door has a glass component (custom profile shape).  
If you apply muntins to the elevation representation, you must also apply them to the model rep.

#### Openings

Openings are added just like a door or window.  
Openings are one of the few ADT objects that are not style based. This means that if you create one in the drawing and modify its display properties, just use add selected to add more openings that look like the one you created.  
While you are trying to get the opening to look like you want it to for your CD's, don't forget that it has a different sill representation separate from the plan representation and you can use both of these to get what you want.

#### Gothchas

Check you vertical alignment (properties page) is set to threshold for door and head for window  
The muntins must be adjusted for each of the display reps you are going to use

#### My arched door looks like a stop sign...

AECFACETDEV: (Facetdev (ADT3)) (on the Options, AEC Object Settings tab 2004/5)  
Variable from 0 to 1 Controls tessellation of curved walls  
I.e.  $1/8$  = more segments than  $3/4$ . Set at  $1/2$  by default, this value seems to me to be a bit too large. If you present Demo's, you might want to reset this in your demo sets. This affects a whole lot of things with curves such as the circle of a plan view of a column, and curved profiles set as a shape of a window or custom door.

## Advanced

### Creating a panel door

This article is from the knowledge base Date Revised: 08/30/1999 Solution ID: TS38774, but still valid in ADT 04/05/06 (different interface, but generally same process)

Problem: AutoCAD Architectural Desktop 2.0 does not provide panel doors or explain how to create them. (Same as 04/05/06 – read on...)

Solution: AutoCAD Architectural Desktop 2.0 includes several features to enhance the creation of doors and windows. One of these new features is the ability to attach a custom block to the different view representations of doors.

OK this has been around for a long time, but it is the same process you can add a custom block to a railing, window, curtain wall etc..I have rewritten this for 04/05/06 because of the interface change you will be getting things from different places.

To do this, create an AutoCAD block of a single panel, and apply that block to a custom door created from a profile.

- 1) *The first thing you need to do is create a new door style:*
- 2) *Open the Doors - Custom (Imperial) drawing from the content folder.*
- 3) *In the Style Manager select Door Styles.*
- 4) *Choose the New button. Enter a name for the new door style, then double click the name to edit the new style.*
- 5) *Select the Design Rules tab, enable the Custom Shape setting and select the Panel door shape, which was created in the drawing as a profile. (To see what the Panel door shape looks like, select Insert Profile as Polyline from the Format pull-down menu, then insert the Panel door shape.)*
- 6) *Choose OK until all dialog boxes are closed.*
- 7) *In the drawing, insert the new door into a wall. Note that although the door appears to have panels; they are not three-dimensional.*
- 8) *Now that the door style is created, perform these steps:*
- 9) *Right click on the door, and select Entity Display.*
- 10) *Select the Door Property Source and select Attach Override and Edit Display props.*
- 11) *Select the Other tab from the Entity Properties dialog box.*
- 12) *Choose the Add button to access the Custom Block dialog box.*
- 13) *Choose the Select Block button and attach the Aec\_Door\_Panel block.*
- 14) *Select the appropriate check boxes to Scale To Fit for the Width, Depth, and Height.*
- 15) *For the insertion point, choose Center for the X value, Front for the Y value, and Bottom for the Z value.*
- 16) *(The insertion point is the point that the block will be inserted in respect to the door itself. If you insert the block into the drawing, you will notice that the insertion point of the block is in the center of the block and located at the bottom of the block.)*
- 17) *Choose the Glass Component for the Component type. Do not change the default setting for "All Selected". (If you select the Single option, the number will be listed as the default. This number corresponds to the number of voids created from the AEC Profile, which will result in this door having six different components set up.)*
- 18) *Choose OK to return to the drawing.*
- 19) *The new panel door is now created.*

### Creating custom door and window frames

Date Revised: 10/07/1999 Solution ID: TS41955

Problem: All door styles and window styles utilize the same default frame design.

Solution: You can create custom door frames and window frames.

This one is the same as the last one but different – manipulates the frame – I have not revised this - ddd

- 1) *Set the current layer to 0.*
- 2) *Create the desired frame trim shape as a closed polyline.*
- 3) *Enter ROTATE3D on the command line.*
- 4) *Select the polyline of the frame trim shape and press ENTER.*
- 5) *Enter X on the command line and press ENTER.*
- 6) *Select a point on the block when prompted to specify a point on the X axis.*
- 7) *Enter 90 on the command line and press ENTER.*
- 8) *Create a polyline with the appropriate dimensions and shape for your frame object.*
- 9) *Move the polyline of the frame trim shape to one end of the polyline that represents the door or window object.*
- 10) *From the Draw menu, select Solids Extrude.*
- 11) *Select the polyline of the frame trim shape and press ENTER.*

## Building Objects

- 12) Enter *P* on the command line and press *ENTER*.
- 13) Select the polyline representing the door or window object as the extrusion path.
- 14) Enter *ROTATE3D* on the command line.
- 15) Select the extruded 3D solid and press *ENTER*.
- 16) Enter *X* on the command line and press *ENTER*.
- 17) Select one end of the extruded 3D solid when prompted to specify a point on the *X* axis.
- 18) Enter *90* on the command line and press *ENTER*.
- 19) From the *Draw* menu, select *Block Make*.
- 20) Create a block from the extruded 3D solid.
- 21) Select the door to be modified, right-click and choose *Entity Display* from the shortcut menu. Select the *Display Props* tab.
- 22) Applying the custom frame for the *Model Display Representation*:
- 23) Set the *Display Representation* field to *Model*.
- 24) Select *Door* as the *Property Source*. This will apply the custom frame to this single door object. If you want the custom frame to be applied to all doors of the same style, select *Door Style*.
- 25) If you want the custom frame to be applied to all doors, select *System Default*.
- 26) Choose *Attach Override* and choose *Edit Display Props*.
- 27) Select the *Other* tab and choose *Add*, Choose *Select Block*, select the block created from the extruded 3D solid, and choose *OK*.
- 28) Select the *Scale to Fit* options for width, height and depth. You might also need to modify the *Insertion Point* and *Insertion Offset* settings depending on the insertion point for the original block and the desired results.
- 29) Verify that the *Component* is set to *Frame Component* and that the *Outside* option is selected and choose *OK*.
- 30) Select the *Layer/Color/Linetype* tab.
- 31) Select the *Frame* component and turn off its visibility. There are two *Frame* components listed in this area. Turn off the visibility of the *Frame* that is the second component in the list. Choose *OK*.
- 32) Applying the custom frame for the *Plan Display Representation*:
- 33) Set the *Display Representation* field to *Plan*.
- 34) Repeat steps 2 through 10 of the preceding procedure, "Applying the custom frame for the *Model Display Representation*." Choose *OK*.
- 35) Note: It may be necessary to turn off the visibility of *Stop* component in addition to the *Frame* component depending on the custom shape utilized. If you are extruding a frame trim shape for a window, start the extrusion from a mid-point of the polyline to achieve the best results. Starting the extrusion from an end point can cause problems with the final results.

### Adding handles to doors

Date Revised: 08/17/1999 Solution ID: TS38641

Problem: AutoCAD Architectural Desktop 2.0 includes several features to enhance the creation of doors and windows. One of these new features is the ability to attach a custom block to the different view representations of doors.

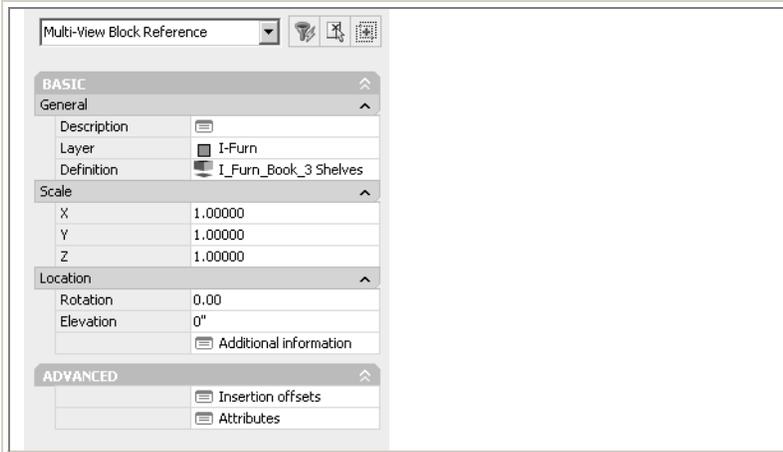
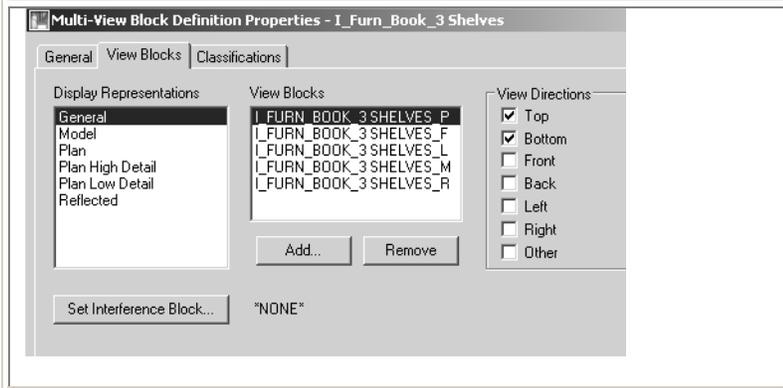
Solution:

- 1) Create an AutoCAD block that represents a door handle.
  - 2) Draw a standard wall and insert a standard door.
  - 3) Change the view of the drawing to a model view.
  - 4) Right-click on the door and select *Entity Display*.
  - 5) Select the *Display Props* tab.
  - 6) Highlight the *Door Property Source*, select *Attach Override*, then *Edit Display Props*.
  - 7) Select the *Other* tab, then choose the *Add* button to attach a block.
  - 8) Choose the *Select Block* button and choose the block that represents the door handle (step 1).
  - 9) Enter values that represent the location of the door handle. For example, if you look at a door that has a handle on the left, use the following values.
  - 10) (Note: The values entered will be different depending on the insertion point of the block and the swing location of the door.)
  - 12) If the door handle is 3" over from the left of the door, select *Left* for the *X* position and 3" for the *Insertion Offset*.
  - 13) Select *Front* for the *Y* value, and enter 0" for the *Insertion Offset*. This is based on the door handle block's insertion point located in the center and the back of the handle).
  - 14) The door handle will be 3'-0" from the bottom of the door, therefore select *Bottom* from the *Z Insertion Point*, and enter 3' for the *Z Insertion Offset* value.
  - 15) After you have entered the appropriate values, choose *OK* to return to the drawing.
- 16) To attach a handle on the other side: Repeat steps 4 through 9. Be sure to select the check box to mirror the handle in the *Y* direction, then choose *OK* to return to the drawing.

# Multi View and Masking Blocks

## Basics

Most of the content in the DesignCenter's Design folder are MultiView or MvBlocks

	<p><b>Properties</b></p> <p>Not a whole lot here</p>
	<p><b>Definition</b></p> <p>The MultiView Block definition is its style. This is where standard ACAD blocks are assigned to each view direction for each Display representation</p>
	<p><b>Display</b></p> <p>MvBlocks don't use the standard display mechanism quite– it is all stored in the MvBlock definition. The display system calls a representation from the block, but it is the block definition that controls what happens at that point</p>

## Adding

Drag and drop from DesignCenter  
 Drag from Design Center to the Palette and add from there.  
 Insert > MvBlock if definition exists in drawing.

### Tool, RightClick > Apply to:

Not available

### Pick points

Placing the MvBlock is different from Design Center than palette. If you drag from the DesignCenter where you let up on the left mouse button is where the block is inserted. You get a bit more control if you drag the block to a palette

### Modifying Attributes

If you have a MvBlock that has attributes (standard elevation or section bubble in ADT – the one without the page ref) select it and go to the properties page and pick the attributes worksheet.

### Gotcha's

You drag a switch to the plan view and it shows up – by the way, switches and recepts use the drawing and annotation scale like a door tag. Everything is groovy.

You drag a light fixture to the plan view of the drawing and it does not show up.

You change the display configuration to Reflected and the light shows up, but the switch disappears.

Edit the multiview block definitions – Add the plan view (ACAD) block to the reflected display of the switch, to have it show up in both the floor plan and the RCP.

### Etcetera

Because the MvBlock definition holds several standard ACAD block definitions, you cannot purge these ACAD block definitions until you purge the MvBlock style.

NEVER turn off/freeze layer 0 – if all of your MvBlocks disappear at once – it is probably because layer 0 is turned off. Most of the content has the sub dependent view blocks defined on layer 0 with visibility set to ByBlock.

Another old tech support issue from the older knowledge base that is still valid

Issue: Multi-view blocks, such as electrical fixtures are not visible in a plan view.

Solution

*These steps illustrate an example for modifying representation sets:*

1. Create a new drawing using the A-Design-Model template.
2. Use the Zoom Window command to zoom into the center square (numbered 5 in the upper right corner of the viewport).
3. Enter MS on the command line to change from paper space to model space.
4. Select the Plan viewport as the current viewport.
5. Access the Electrical Fixtures command (Design > DesignPart Library > Electrical Fixtures). 6. Select "2X4 Emergency" from the available palette, then choose OK.
7. Press ENTER to accept 0 as the default rotation angle.
8. When prompted to Select Object To Mask, press ENTER.
9. Press ENTER twice more. The symbol will be inserted. You will only see the 2X4 Emergency symbol in the model viewport. The default representation set for this view does not display these blocks.
10. Select the Plan viewport to make it current.
11. To check the display configuration for the plan viewport, select the Select Viewport Display command in the Desktop pull-down menu. The Viewport Display Configuration dialog box will display.
12. The display configuration for the plan viewport will be highlighted. In this case, the display configuration is Work. Choose OK to exit this dialog box.
13. Use the Edit Display Configurations command (Desktop > Display Control > Edit Display Configurations), highlight Work, then choose the Edit button.
14. Select the Configuration tab. Notice in the "View Direction Dependent Display Configuration" section a detailed list of the View Set used for each View Direction. For this example, the top view is uses the Work\_Plan View Set. Choose OK the next two dialog boxes to exit to the command line.
15. Use the Edit Representation Sets command (Desktop > Display Control > Edit Representation Sets), then highlight the Work\_Plan representation set and choose Edit.
16. Select either of the Display Control tabs to view the components that are currently enabled in the representation set. You can modify these settings as desired. In this case, the "Multi-View Block Reference -- (Reflected)" needs to be enabled in order to view the 2X4 Emergency in plan view.
17. Enter RE for regen on the command line to refresh the display. Note: Although this example uses an electrical fixture and the Work\_Plan view, the same principle is true for all representation sets and Architectural Desktop components.

# Profiles

## Basics

The basic way to input a custom shape into a style. Can be used to create custom shapes for: Doors, windows, openings, railing components (any of them) wall sweeps, roof fascias and soffits, slab edges, extruded mass elements, rotated mass elements and more  
Will only exist in the style manager, never in the drawing as a "Profile"  
Remember proper drawing etiquette when creating pline; No overlapping lines, No zero length segments  
Can be multiple closed polylines

## Definition

A profile definition is just the geometry pulled from a closed polyline.

## Creating

Draw a CLOSED polyline, RC> convert to > Profile definition (works on multiple Plines)

Or

Create a new definition in the style manager right click on the new definition and pick Set From to put you in the drawing to pick an existing polyline. (or several), pick an insertion point

## Modifying

Because it does not exist in the drawing, modifying consists of creating a new polyline and overritting the existing definition.

If you want to modify a profile definition, use the Format >Profiles > Insert Profile as Polyline. Make the modifications to the polylines and then overwrite the definition with the new geometry. (style manager set from or RC>convert to Profile definition)

## Etcetera

Almost all profiles are ok with centroid as insertion point. Exceptions to this are profiles created for:

Wall sweeps

Slab edge styles and roof slab edge styles

The command line prompts that you get with the RC > Convert to >profile are a little different than if you use the style manager RC > Set From. But the results can be the same.

# Roofs

## Basics

A shed roof is nothing more than a roof with three sides "Edit Edges" and change slope to 90.  
Generate low slope roofs that are within parapeted walls from polyline created within wall boundaries.  
A roof behaves like a closed polyline  
Go as far as you can with a roof before converting it to a roof slab, and then only if you really need to.

## Properties

Edge control

## Style

## Display

## Adding

Tool, RightClick > Apply to:

## Pick points

## Other

## Modifying

## ACAD modifying

## RightClick Tools

## Etcetera

Mysterious/Dangerous

Roofs have no true plan rep. and as such need to be flattened to Z=0 in consultant drawings  
!!!Watch your snaps around roofs and roof slabs!!!

A flat (shed) roof is a roof with 3 edges at 90 degrees.

# Spaces, Zones, Space Boundaries and Room Tags

## Spaces One Sheet:

### Spaces

The Space object in ADT is the basic object to represent an area or volume such as a room or building in a master plan. There are many different things you can do with a space. There are also many ADT objects that are directly related to spaces.

### Zones

A Zone in ADT most simply put is a collection of spaces. Where a space can report its area, perimeter or volume to the properties page or into a schedule, a Zone can report this same information about a collection of spaces. A commercial example would be BOMA calc's where the all of the stairs and elevators though separate space objects would be reported as vertical circulation. A residential example would be all the conditioned areas reported out as the liveable area of the house.

### Space Boundaries

A Space Boundary is a wall like object that surrounds a space. More used in versions prior to ADT 2007, it can still be used in space planning as an approximation of a wall. You can add doors and windows to a space boundary and also convert it to a wall, but it cannot have sub components such as gwb and studs as a wall can. With the release of 2007, walls themselves can act as bound of a space and the space itself can update as the design changes

### Room Tags

A Space is an ADT object with a floor and ceiling.  
By default in plan view it is drawn with a hatch.  
Spaces are style based and the style controls:

- Generally what the hatch looks like
- 

### Basics Spaces

A floor and a ceiling, plus the space above the ceiling  
Has its own query function to find square footage by style (only available from the design pulldown)  
Useful for space planning, Project program writing,  
Mysterious or just disconcerting: Floor will always extend below world UCS  
Can be used as clipping plane for ceiling grids  
Cntl-shift to duplicate space boundaries  
Troublesome: When you are doing room schedules, it wants to look for the room tags When you place a room tag, it wants to attach itself to a space object. See Etcetera

## Properties

## Style

## Display

## Adding

## Tool, RightClick > Apply to:

## Pick points

## Other

## Modifying

## ACAD modifying

## RightClick Tools

## Space Boundaries

Outside In from slices (mass of the building determine the shape of the space, space is this divided)  
Inside Out from spaces (Spaces representing rooms are creating, then grouped together and used to generate boundaries.

Boundaries generated from spaces get their width from the space style net to gross, but their height from the space properties

## Room Tags

## Etcetera

## Creating a single wall between adjacent Space boundaries

Date Revised: 07/09/1999

Solution ID: TS18813

Problem: When you generate walls from two adjacent space boundaries, the common edge is drawn as two separate walls (rather than as one wall).

Solution: To create a single wall between Space boundaries:

- 1) *Select the Concept menu > Space Planning > Add Spaces.*
- 2) *Insert two rectangular spaces so that they share a common edge.*
- 3) *Right-click on one of the rectangular spaces and select Edit Space Style.*
- 4) *Select the Dimensions tab and set the Net to Gross Offset value to 0".*
- 5) *Repeat steps 3 and 4 for the other rectangular Space.*
- 6) *Select the Concept menu > Blocking and Boundaries > Convert to Boundary > Convert from Spaces. When prompted to select Spaces, select the rectangular Spaces you inserted in step 2.*
- 7) *Right-click on the Space Boundary and select Boundary properties.*
- 8) *Select the Dimensions tab. Choose Solid Form for the Segment Type and set the width to the desired wall width. Choose OK.*
- 9) *Right-click on the Space Boundary and select Generate Walls.*
- 10) *Right-click on the Space Boundary and select Generate Walls.*
- 11) *The adjacent edges will form a single wall.*

# Stairs

## Basics

For multistory buildings with even number of risers, use 'multi-landing' stair to avoid goosenecks  
 U shaped stair cannot have top riser expanding past the bottom riser – use multilanding stair instead  
 Can be converted from plines (does not do curves, see etcetera below)

## Properties

Shape determines pick points when adding  
 Vertical Orientation: what is first pick point – top or bottom of stair

Calculation Rules: Use to "Unlock" stair length, riser count, riser or tread values.

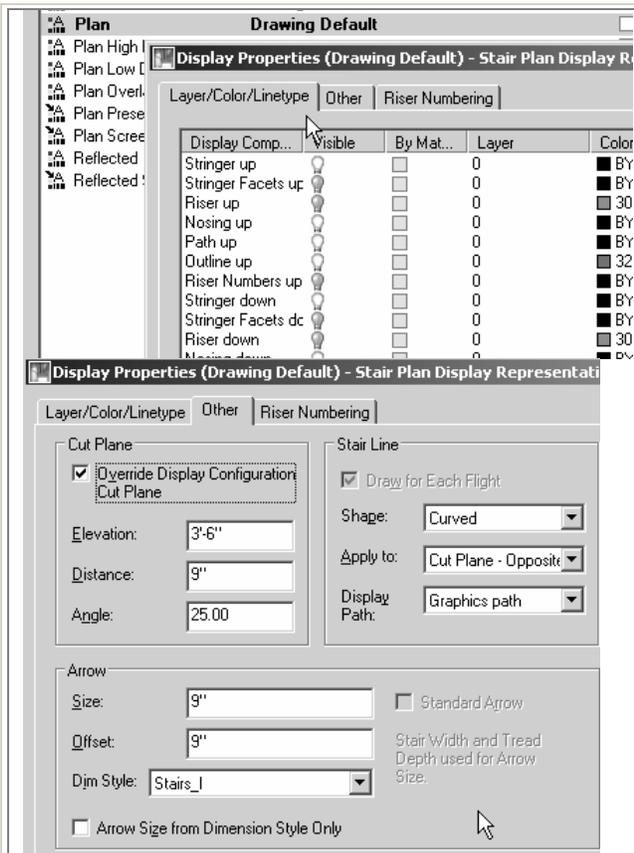
Interference – used for spaces

## Style

Stair styles hold code limits – change for residential stairs

Landing Extensions – determine railing extension past bottom riser if not set in railing style.

Also control Phantom or Ghost tread for stair.

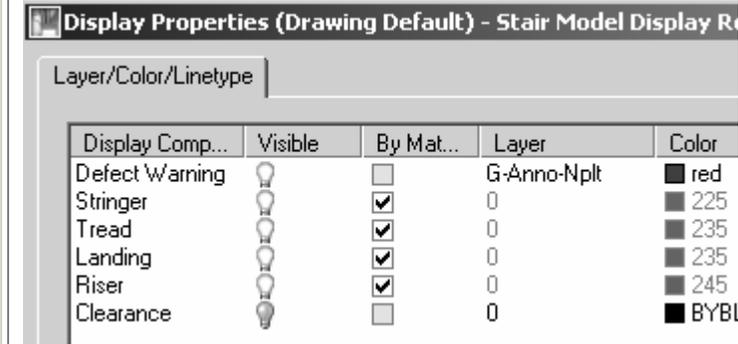


**Display Rep Plan**

Control the Layer/Color/Linetype of each component above and below the cut line separately.

Use Display control to create 'bottom floor' and 'top floor' stairs: Bottom floor stairs have all "Down" Plan components Hidden 2 and grey.

Control the cut plane and arrow as well as the type of break mark on the "Other tab"



**Display Rep Model**

For your top floor stair, turn off all the model components

Top Floor Stairs have all model components turned off so you do not see a stair going through the top of the building section or elevation

**Adding**

**Tool, RightClick > Apply to:**

Only Stairs – see note on StairConvert below

**Pick points**

Points picked are determined by shape of stair in the properties box. Each stair has different set of pick points – straight run and multi landing both alternate between adding landings and adding stair runs until the stair is complete. U-shape stair just gets bottom and top of stair – two picks

## Other

## Modifying

### ACAD modifying

Shift, Alt do different things on grip stretch

### RightClick Tools

### Etcetera

StairConvert at the command line will convert a polyline to a stair – I have not seen a tool to do this, and right click apply tool properties to does not have polyline as option.

No custom blocks assigned to display – assign custom blocks to railing and attach railing – turn off stair model display if needed.

R3 and previous problem: By default, stairs are represented as a whole object, and the Cut Plane Height rules that apply to the walls do not apply to stairs.

*Solution: Note: In Plan View, the representation of the stair should show only its bottom portion, or the portion below the Cut Plane Height. In some instances, the cut height of the stair will not coincide with the Cut Plane Height setting for the walls within the same project.*

- 1) Draw a stair. While in Plan View, right-click, then select Entity Display.
- 2) Select the Display Props tab, and choose one of the following options as needed: Stair, Stair Style, System Default.
- 3) Choose Edit Display Props, then select the Other tab.
- 4) Change the following options:
- 5) Cut Plane Elevation - the cut plane height of the stair, that is, the height at which the stair will be interrupted. The default value is 3' 6" to match the Cut Plane Height default value of Wall Objects.
- 6) Cut Plane Distance - the distance within the above interruption - in case the stair is to be displayed above and below the Cut Plane. The default distance is set to 9" to match the distance assigned to the Cut Plane Distance default for railings.
- 7) Cut Plane Angle - the angle used when generating the interruption. The default value is 25.
- 8) Select the Layer/Color/Linetype tab.
- 9) Turn off one, some, or all of the following options as desired: Stringer Up / Down, Riser Up / Down, Nosing Up / Down, Path Up / Down and Outline Up / Down.

*Notes: The Up and Down settings use the orientation of the directional arrow on the stair. For example, when you turn off the Down options, only the upper portion of the stair is displayed.*

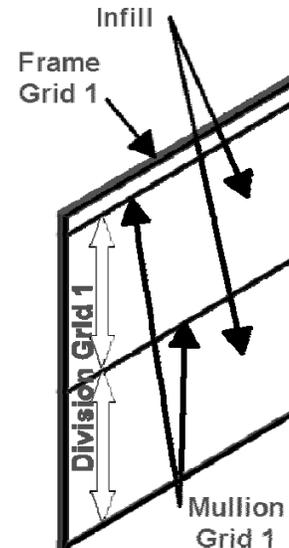
*Note: It is advisable that the Cut Plane Elevation, Distance, and Angle of the stair match the same settings for the railings attached to the stair.*

# Curtain Walls and Door/Window Assemblies Terminology

There are three objects in ADT that all use the same interface but behave a bit differently: Curtain Walls, Curtain Wall Units and Door/Window Assemblies. Each of these objects uses the same style dialog boxes to create and manipulate their styles. The differences in these are:

- Curtain Walls stand alone and can have Curtain Wall Units assigned as an infill panel
- Curtain wall units cannot have styles as infills. These are assigned within a curtain wall – to perhaps fill in for an entire floor
- Window assemblies break a hole in the wall and become anchored to the wall like a single door or window.

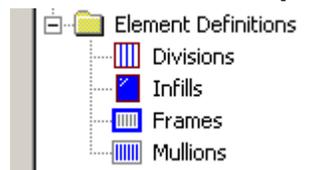
Regardless, all of these styles have the same interface when it comes time to edit their styles. This interface can be daunting until you realize there is a method to the madness. This chapter introduces you to the KIT of PARTS and SET of RULES that organizes the madness into a system that is understandable.



## Kit of Parts and Set of Rules

I like to think of window assemblies, curtain walls and curtain wall units as a kit of parts and a set of rules. Both of these are accessed from the Design Rules tab of the style. The Kit of parts consists of the Element definitions (on the left) and the Set of Rules is where you assign this kit of parts to the style (in the right pane of the dbox).

### Kit of Parts: Four parts



**Divisions** are how the grids within a curtain wall are established.

**Infills** are what happens within a grid

**Frames** wrap around each grid

**Mullions** happen at each grid line

### Mullions and Frames

Frames are around the outside of a grid. A mullion is placed at each grid spacing

Mullions and frames basically have the same control.

Width – think of a frame running vertically and you are looking at it from the front.

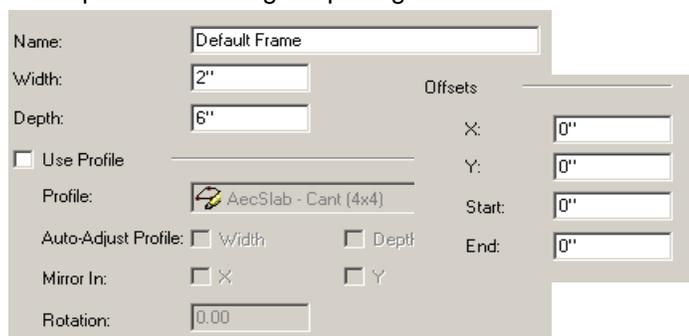
Width will be how wide the frame or mullion is.

Depth is the thickness in the wall

Offsets: Again, think of a wall drawn from left to right – X offset will shift left and right,

Y will shift in the depth of the wall

Use Profile: - any shape you can draw as a closed pline, you can make into a profile and use as a frame or a mullion.



## Divisions

Divisions establish how often the grid is broken up.

Name:

Orientation:

Division Type:

Start Offset:

End Offset:

Cell Dimension:

Auto-Adjust Cells

Cell Adjustment:

Specific Cells:

Fixed Cell dimension (every thirteen feet)

Fixed number of cells (make it three divisions no matter how high it gets)

Manual (Absolutely make a division 15' above the baseline, 27' above the baseline etc)

BaseLine/BaseHeight

Also here is the AutoAdjust Cells where you specify what happens if the dimensions of the grid fall in between grid lines

## Infills – what happens inside the Grid

Name:

Infill Type:

Alignment:

Offset:

Style:

- + AEC Polygon Styles
- + **Curtain Wall Unit Styles**
- + Door Styles
- + Window Styles
- + Window Assembly Styles

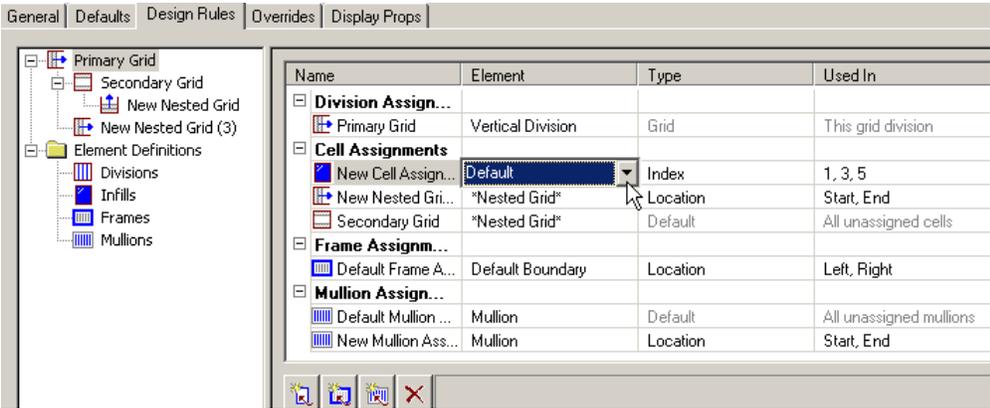
You can get creative with simple panel infills – a stone panel may be an infill that is 8 inches thick, the mortar joint a mullion that is ½ inch x 7.5 inches

You can use a style as an infill – doors and windows – the window or door will fill up the “cell” it is assigned to.

## Nesting Grids

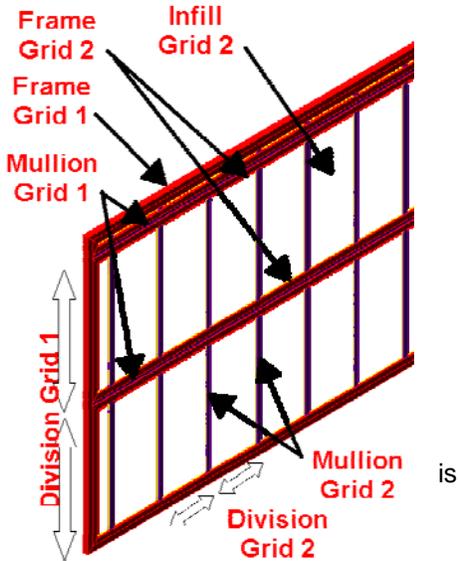
OK, that is the kit of parts...where it gets complex is when you have a grid nested inside another grid, which brings us to...

### The Set of Rules!



At the upper left is the Grid Tree that displays the grid arrangement = **WHICH GRID** (as you pick different grids at the upper left, you see a new arrangement on the right) On the right is where you assign the kit of parts to the grids. The first column “Name” tells you **What Part** (element) you are working with. The second column shows what definition is assigned to this grid. Although the pull down arrows do not show normally if you pick in the element area you get a pull down as shown above to choose the element definition. The third column “Type” is **Where** you want the element placed in relationship to the grid. Do you want this one infill placed by location (start, Middle, end) or by Index number (proceeding from start to end, on bay numbers 1,3,5)

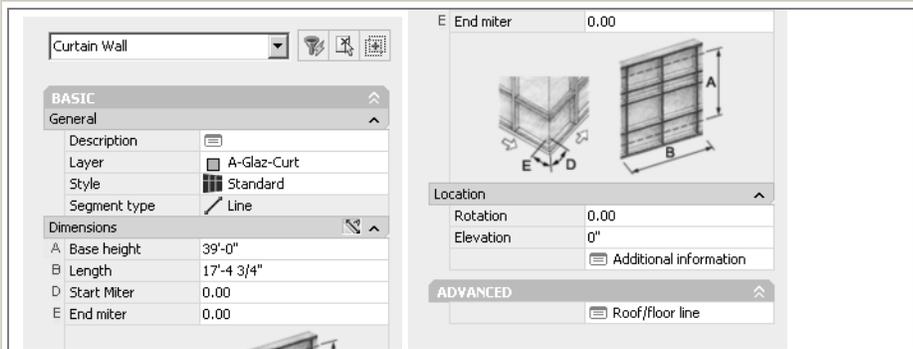
In the illustration at the right, the infill for the primary (grid1)grid a nested grid – instead of putting an infill in the ‘cell’, we put a grid inside the cell.



# Curtain Walls

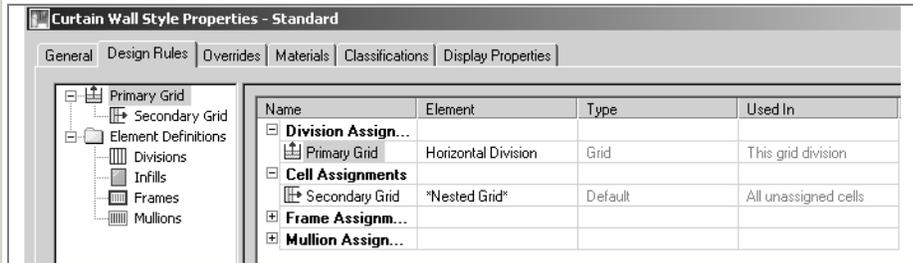
## Basics

Too complex for their own good, there is a method to their madness, or you may apply your own madness methodically and get good results



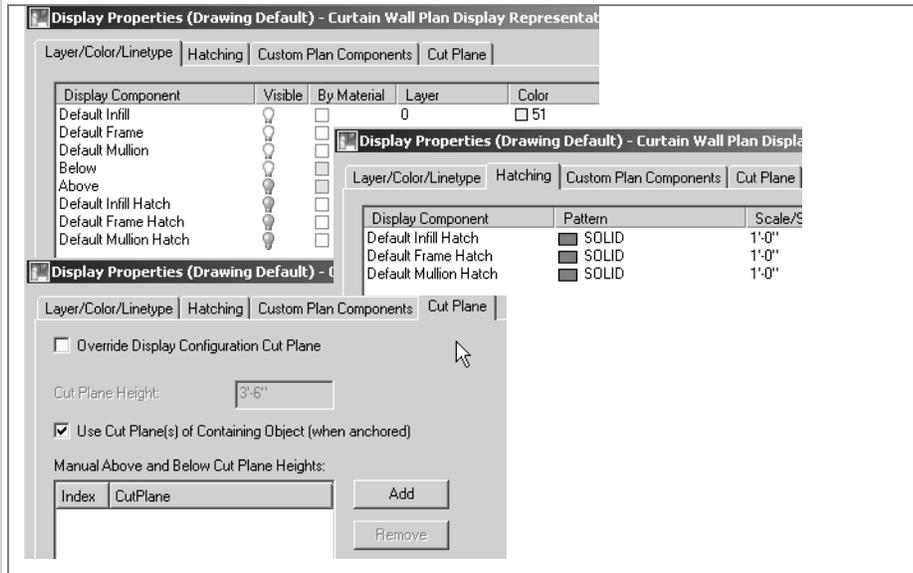
**Properties**

Not much to the properties, just height, width, end miters that are easier to do with the set miter angles from the right click menu.



**Style**

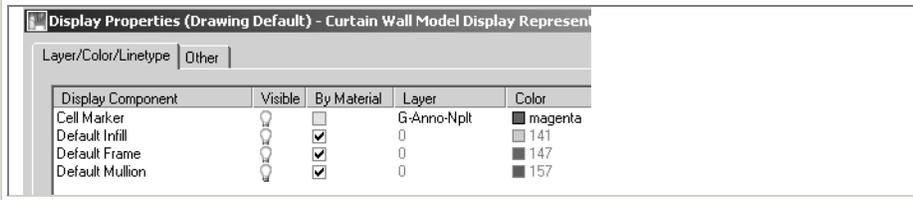
Everything is in the style – see separate handout on curtain walls and window assemblies.



**Display Plan**

Not too many surprises, Add ACAD blocks: to add to or replace components in the style in the Custom Plan Components of the Plan Representation

Cut plane is hold over from pre 04/05/06 Now use the display config to set this kind of cut plane



**Display Model**

Use the Other tab to assign custom blocks in model view

## Adding

Pick Points  
Added like a wall, two pick points

No justification, always center line

### **Tool, RightClick > Apply to:**

#### **Curtain Wall**

Use to apply current TOOL PROPERTIES to an existing curtain wall (a kind of match props)

#### **Wall**

Use to convert a wall to a curtain wall

#### **Layout Grid**

Create layout grid in elevation (old R2/R3 trick). This will take layout and transfer it to a curtain wall. If you have doors or windows anchored to the grid, they will be deleted with the layout grid.

#### **Reference Curve**

No curve in adding, but you can RC>apply to>referenced base curve and pick arcs or plines with curves.

Length of curtain wall linked to curve (line)

#### **Elevation Sketch**

Converts linework drawn in elevation, to curtain wall style – enters edit in place mode, remember to save these changes back to style and save to a new style

#### **Pick points**

Just like a wall without justification (always drawn at 'centerline' )

#### **Other**

### **Modifying**

#### **ACAD modifying**

Extend, Break and Trim work  
Fillet does not.

### **RightClick Tools**

#### **Design Rules, (like edit in place)**

##### **Transfer to object**

Puts the design rules on the objects (don't use style when in this mode)  
Use for applying overrides that you want to eventually write back to the style  
When done overriding, use...

##### **Design Rules, Save to style**

Only available if Transfer to Object has been activated.

#### **Component tools; Infill, Frame/Mullion, Division**

Use to override existing parts of the curtain wall in the drawing

##### **Infill- Show Cells**

Displays cell marker so you can select them to merge or override

##### **Merge**

Combine two cells together

## Building Objects

### Override - infill, Frame/Mullion or division

Apply new definition to existing parts of the curtain wall. The new definition MUST exist in the style definition before you do this.

### Frame/Mullion Add Profile

Adds profile definition so you can use it to replace standard rectangle shape

### Roof/Floor line

Just like a wall, A to autoproject to an AEC object, P to project to polyline. Or edit in place. When you edit in place the right click menu changes (add vertex etc)

### Interference

Cheap way to add a window assembly.

Show markers, merge cells, override bottom frame, add window assembly to drawing (not to a wall).

Move it into position and apply it as interference to the curtain wall.

### Etcetera

Curtain Walls can have styles as infills (AEC Polygon, door style, window style, curtain wall assembly style (a "nested" curtain wall))

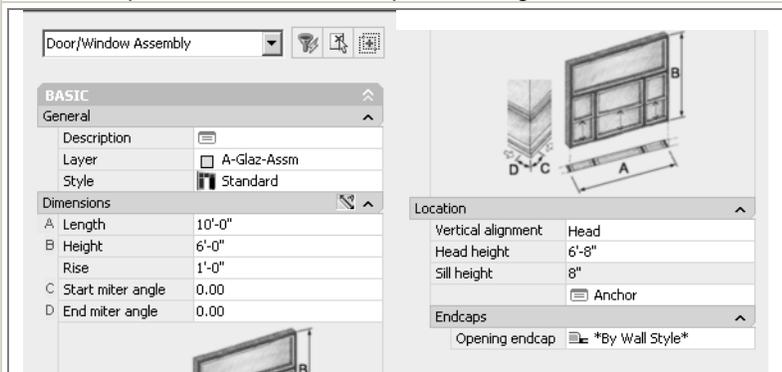
Easiest way to create front entry is to apply Door Window Assembly as override. Door Window Assembly must exist in the curtain wall style as an infill definition.

When you convert from linework, frames will be outside justified, mullions will be center justified – see handout for exercise on how to fix this.

# Door/Window Assemblies

## Basics

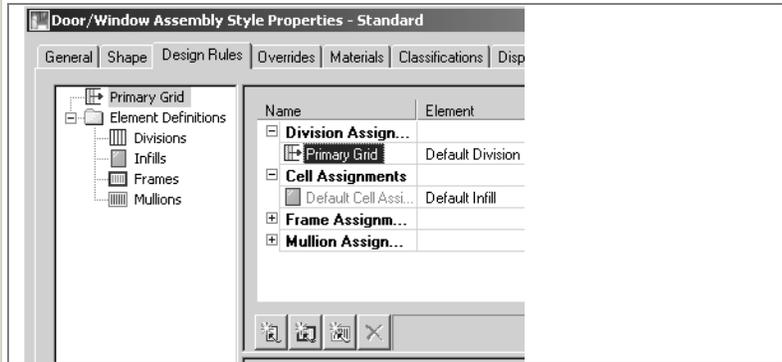
See complete handout for in depth coverage



### Properties

Properties are mostly about size, head height, sill height, etc

Depending on the Style of the Assembly, it may or may not adjust to different widths and heights well.

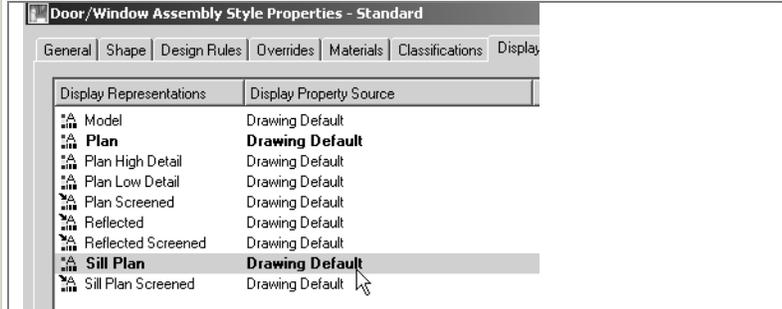


### Style

Style controls behavior of the assembly as it grows

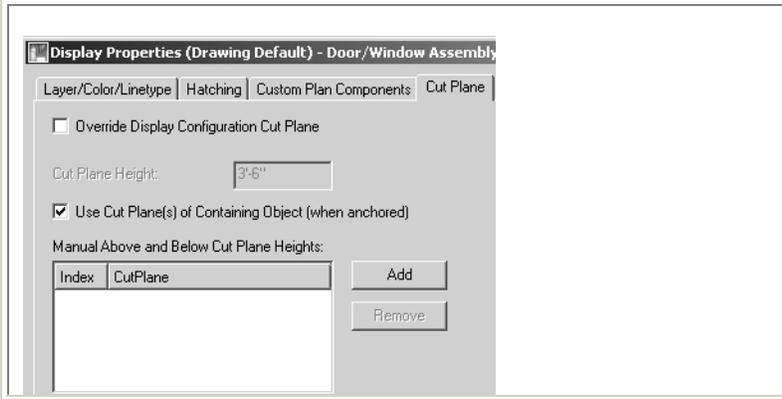
Almost everything is here in the Design Rules tab.

Create the Element Definitions first and then assign them to their place in the grid or nested grid



### Display

Assemblies do not have an Elevation representation, but do have a sill plan



### Display Rep Plan Cut Plane

Use the Plan representation override cut plane to assign an override to the style

### Adding

#### Pick points

Pick wall to place assembly in, pick position for assembly. Same as door, use tab key to cycle through visible dim values when placing,

#### Tool, RightClick > Apply to:

##### Door / Window Assembly

Apply the Tools Properties to another Assembly

##### Doors, Windows and Openings

Converts a door or window or opening to an assembly. This just applies the tool properties to the object. Original width is discarded.

##### Layout Grid

Same as a curtain wall. Create layout grid in elevation (old R2 trick). This will take layout and transfer it to a curtain wall. If you have doors or windows anchored to the grid, they will be deleted with the layout grid.

##### Elevation Sketch

Converts linework drawn in elevation, to Assembly style – enters edit in place mode, remember to save these changes back to style and save to a new style.

##### Other

Watch the insertion set to Sill/head for a window assembly – if the assembly goes through the bottom of the wall, the default is set to place the assembly by the head height

### Modifying

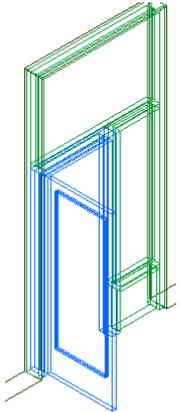
#### ACAD modifying

Grip stretch same as doors

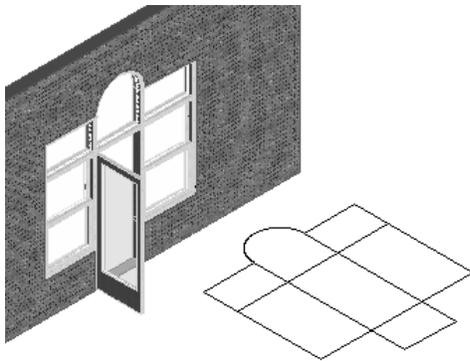
#### RightClick Tools

You get the same right click controls on a window assembly that are described for a curtain wall. These allow you to override a cell, frame, mullion or division  
Etcetera

Created for the intermediate class, this chapter has two different exercises.



This first exercise shows how to create a window assembly from scratch using the style interface. This exercise puts together a window assembly that looks like the image above.



The second exercise outlines how to create a window assembly from lines, and then create new infill and mullion assignments with overrides.

### Door/Window Assembly Exercises

## Creating a Simple Style Based Window Assembly

Exercise overview. In this lesson we will create a window assembly that has a door in the middle, a sidelight with a kick plate at the bottom.

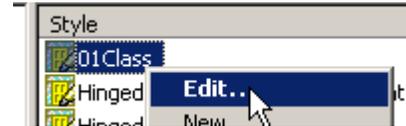
Process

- Create and edit new Style,
- Create kit of parts, divisions, Infills, Frames and Mullions you will need for the window assembly
- assign these parts to the grid, create new nested grids as needed

GO...

### Create a and edit a new Window Assembly style

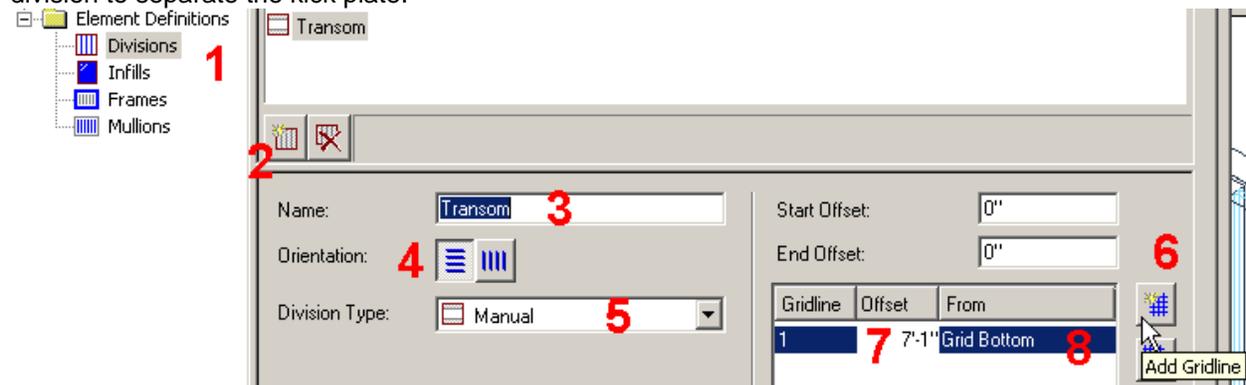
Start with the AEC\_Arch imperial int'l Template  
 Design>Window Assembly>Window Assembly Styles  
 New icon, rename to 01Class, RC>edit



### Create the Kit of Parts

#### Create the Divisions.

We will need a division to create the transom, a division to separate the door from the sidelight and a division to separate the kick plate.



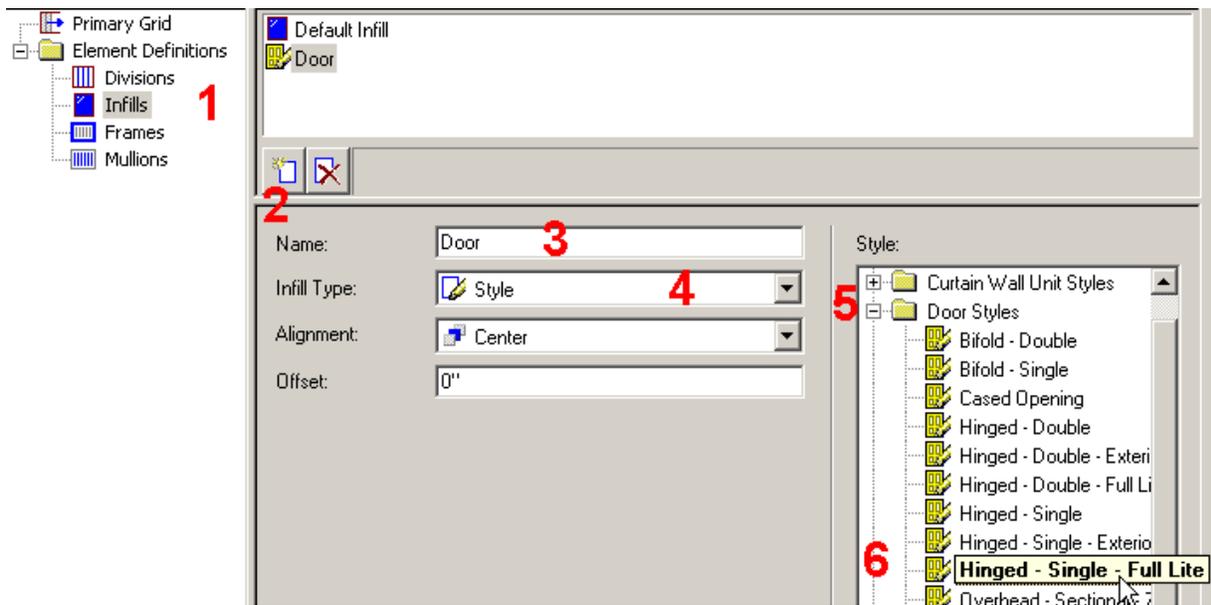
1. On the left under Element Definitions, highlight divisions,
2. Pick the new icon
3. Rename to Transom
4. Pick horizontal orientation
5. Change division type to manual
6. Pick ADD gridline icon
7. Change offset to 7'1" (to go into middle of 2" mullion – later)
8. Choose from grid bottom

Repeat 2-8 adding two more divisions

Name = DoorWindow, orientation = Vertical: Division type = Fixed Cell dimension = 3'-2" (no offsets)  
 Name = KickPlateDiv = Horizontal, Manual, 18" above grid bottom. Pick AutoAdjust right side shrink Drawing at this point is saved in the lesson folder as WindowAssemblySimpleD2.dwg

### Create Infills

We need three infill definitions, but only need to create 2, we will use the default infill for all the glass, so be sure not to change it. We will need to make a door infill and a kickplate infill.



1. On the left under Element Definitions, highlight Infills.
2. Pick the new Infill icon
3. Rename to Door
4. Use the dropdown to change infill from simple panel to style
5. Pick the small plus box to expand the door styles
6. Highlight Hinged – Single Full Lite

Repeat 2-6 adding one more infill

Name = KickPlateInfill; Infill type = Simple Panel; Panel thickness = 3

## Create Frames and mullions

We do not need to create any frames, but we should just change the default to 2” wide and 6” thick for both the default mullion and the default frame. You can make a frame or mullion for a threshold if you want to, see the next exercise on how to do this

1. On the left under Element Definitions, highlight Frames
2. Change the width to 2” leave the depth at 6”

Repeat these sizes for the mullions.

Drawing is saved as WindowAssemblySimpleD3.dwg

Pick OK and OK and save this drawing at this point.

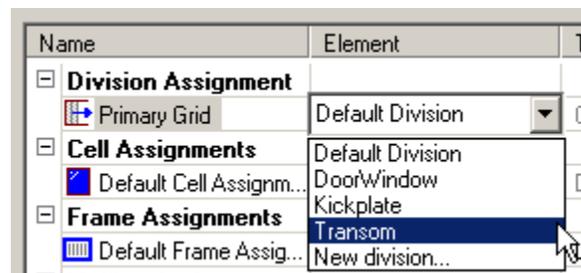
## Put your window assembly together

You now have created all the parts for you window assembly; you now have to establish the grids and nested grids to make it work.

Get back into the edit style dialog box  
Design>Window Assembly>Window Assembly Styles,  
select the 01Class style, RC>edit

1. On the upper left select Primary Grid.
2. Pick where it says default division and change this to Transom

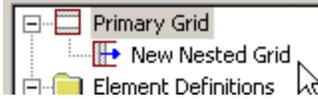
You can see the definition of Transom appears in the lower half of the dialog box. You can have multiple cell assignments in the same grid -



## Building Objects

3. Create a new Cell Assignment by picking on the new Cell icon in the middle left part of the dialog box.
4. Create a nested grid by changing the default infill of the “New Cell Assignment” to Nested Grid
5. Change the location to bottom (pick where it says top, bottom, a “...” will appear, pick this and deselect top

Now you have a nested grid to work with.

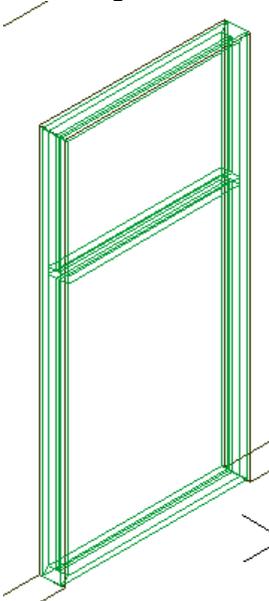


Stop for a minute and think – too much dialog picking can numb the brain. Pick OK, OK, save your drawing.

Add a wall, any wall about 12' high from left to right about 15' long in your drawing and switch to an iso view. Add the Window assembly (tool palettes>DesignPalette>window assembly> select the new style from the properties palette

Make sure the style says 01Class, the width = 5', the height = 10'6" and the **vertical alignment is set to sill height and has 0 for the value** (for some reason on new installs this is set to something else and the window assemblies fall through the floor).

Pick the wall in the drawing to place the window assembly in. Your window assembly should look something like this.



We created the “primary grid” to use a manual division called Transom. Transom is what makes the mullion at the top of the assembly. We then added another Cell to that we could divide the top and the bottom differently. The next steps of the exercise will take us through defining that nested grid, and assigning yet another nested grid to make the kick plate. Notice that even though we have a nested grid, we do not have two frames like the picture in the concepts. By default when you create a nested grid, the nested grids frames are turned off. Sometimes in complex styles you will need to use a nested grid frame. For us, we will have to turn off the bottom frame to make way for the door. One thing at a time.

## Assign the Rules to the nested grid

Select the window assembly and Right Click, Edit Window Assembly Style.

On the upper left, select the nested grid

In the Rules field (the upper right part of the dialog box) add another cell and change the values to match the screen capture below.

Name	Element	Type	Used In
<b>Division Assignment</b>			
New Nested Grid	DoorWindow	Grid	This grid division
<b>Cell Assignments</b>			
New Nested Grid (3)	*Nested Grid*	Default	All unassigned cells
New Cell Assignment	Door	Location	Start

Highlight the next nested grid down and change the values to:

Name	Element	Type	Used In
<b>Division Assignment</b>			
New Nested Grid (3)	Kickplate	Grid	This grid division
<b>Cell Assignments</b>			
Default Cell Assignm...	Default Infill	Default	All unassigned cells
New Cell Assignment	KickPlateInfill	Location	Bottom

Before you leave, go back to the primary grid on the upper left, find the frame, and deselect the bottom OK once to get back to the drawing and you should have something that looks like the illustration on this page.

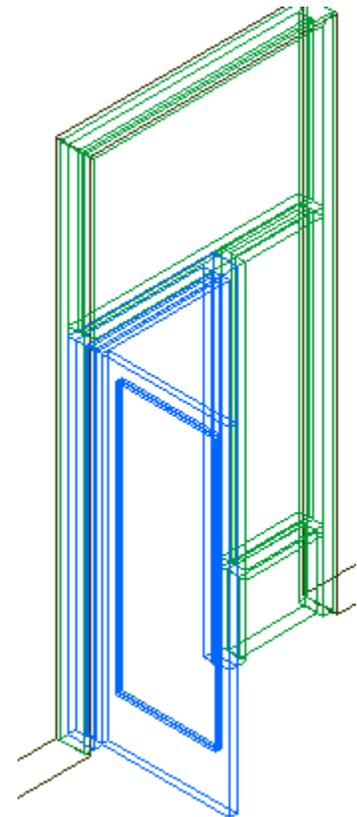
So that's it, intuitive, easy to use interface! – Some more notes. Were I to complete this, there are a few more adjustments to make:

- I would find the frame that surrounds the kick plate and turn the bottom frame on.
- Instead of using one of the template door styles, I would create a door style that had 0 thickness and width for the frame and use it – right now there are two frames around the door - the mullions of the window assembly and the frame of the door style.
- If this were an external door, I would further edit the door style to show the sill on the appropriate side when seen in plan view.

If I needed to model this, I would;

- Create a polyline in the shape of the threshold in section.
- Create a profile from the polylines.
- In the window assembly create a frame definition that used the profile, then...
- Either use overrides (probably) or set in the style definition to use this as a threshold.

Play with this a bit before you close it out. Right click modify it and change its width and height. In plan, grip stretch the swing of the door.



Other thoughts...

If your office created frame schedules and frame type plans you can add window assemblies into a drawing without adding them to a wall, just return at the command prompt when it asks you for a wall to put it in. Place all of your frame styles in plan, then create a paperspace view port that looks at them in elevation.

Once you assign a style to an infill, you have access to that object with the right click menu. Sometimes it becomes difficult to select the window assembly or curtain wall because all there is left of the object is the other objects filling in the cells/infills. – When creating these styles, try to keep at least some portion of the parent object visible so you have right click functions.

The next exercise looks again at the parts, but focuses on editing styles in place, and using overrides to change different components.

### Creating a Custom Window Assembly From Lines with Overrides

Open ...\\LESSONS\\WindowAssembly\\WindowAssembly.dwg

This drawing was created with the AecArch (Imperial) template and the layouts were deleted.

Drawing has linework and wall placed in the drawing as well as some tweaks to a couple styles we will use in the exercise.

Predefined for this exercise are the following styles

Windows:

WindAssmby\_DBLHung window style with the frame turned off

WindAssmby\_Arched window style with the frame turned off

Door:

WindAssmby\_SingleFullLight - Single Hinged door style with frame turned off

These Styles will be used as infills for the window assembly

Overall flow for this exercise

- Create the window assembly from the lines
- Save as a style
- Establish all the different definitions within the style that we need to complete the window assembly. Create infills, mullions and frames.
- Use the override functions to assign the parts created in the style to the window assembly using index numbers.
- Edit in place mode, then save and write the overrides into the window assembly.

Terminology

Frame (the outer component of the window assembly)

Mullion – Any of the internal divisions

Infill – what happens inside each of the areas formed by the mullions and frames.

RC indicates Right Click access to shortcut menu

#### Create Window Assembly From Lines:

1. On the Design Palette, Right click on the door/window assembly tool and select Apply tool properties to>Elevation sketch
2. Select the linework in the lower left of the drawing, Enter, Enter, Enter
3. Window assembly is placed in the drawing

YOU ARE IN EDIT IN PLACE MODE! The first thing we need to do is to save this as a new style.

#### Save as a style:

4. Select the window assembly, RC > Design Rules> Save to style.
5. Pick the new button
6. Give it the name **01Custom**, Pick the OK button, and Pick the OK button again.

You should be back in the drawing, the window assembly is now a style we can use.

#### Add the window assembly to the wall:

7. Use the Door/Window assembly tool to add this window assembly to a wall.
8. In the Properties dialog box
  - Change Style to 01Custom
  - Change vertical alignment to bottom and 0.

- Width = 9'
  - Height = 10'6
9. Select the wall and enter to place the window assembly

(end result shown in WindowAssemblyD1.dwg)

### Establish all the different definitions within the style:

Just as it is when you create a Door/Window assembly style, you create the kit of parts first, you need to do this for this style also.

Create infills, mullions and frames.

The next thing we need to do is to establish the parts we will use to finish the style. The parts and pieces must exist within the window assembly style before we can use them as overrides

We will need the following:

Infills:

“Door” based on the door style WindAssmbly\_SingleFullLight

“SideWindow” based on the window style WindAssmbly\_DBLHung

If you are ahead of the game, go ahead and create another infill called ‘top window’ based on the window style WindAssmbly\_Arched

We will also need some different frames

A frame called ‘threshold’ that has a width of .25 and a depth of 6

A frame W=2, Depth=6

A mullion that has a width of 2 and a depth of 6

A Mullion called “Plus1x”

A mullion called “Less1x”

These two last mullions will be used to align the mullions with the frames

### Establish Infill styles

Select the window assembly, RC > Edit Style, Pick the design rules tab

On the left, select the infills

Pick the new infill icon ( midway down below where it says ‘default infill’)

This creates a new infill

Give it the name **Door**

Change infill type to Style

On the lower right, expand door styles and highlight **WindAssmbly\_DBLHung**

Repeat this creating infill SideWindow based on the window style WindAssmbly\_DBLHung

### Establish Frame Styles

Select Frame on the left

Pick the new frame icon

Call the new frame ‘threshold’ and give it a width of .25 and a depth of 6

Note if you wanted to create a threshold that was sloped, you could draw a closed polylines, create a profile and assign the profile to the ‘threshold’ frame definition here.

We do not need to create a new 2x6 frame, we can just redefine the default Frame

Highlight the default frame (top middle)

Change the width to 2 and the depth to 6

### Establish Mullions

Select Mullions on the left

Change the default mullion to Width = 2, depth = 6

Create a new mullion with an offset (we will assign this to the interior mullions to get them to align with the frame, by default the mullions are center justified and the frame is justified to the outside of the lines we created. Alternatively we could just give the default frame a +1x offset, but the overall width of the window assembly would then be 9'2... ) Note. In general the offsets will work as shown below (plus x offset will move the mullion in the positive X direction ( to the right)), but if the window assembly is placed backwards in the wall, then these directions will reverse themselves. Also as you are creating the line work for the original window assembly, I believe that the direction of the linework is important. Draw vertical lines from bottom to top and horizontal lines from left to right.

Pick the new mullion icon

Give it a name Plus 1x

Width = 2, Depth = 6 and over on the right side, enter 1 for the x offset

Repeat,

Pick the new mullion icon

Give it a name Less 1x

Width = 2, Depth = 6 and over on the right side, enter -1 for the x offset

Ok to return to the drawing.

The frames and mullions changes we made to defaults are reflected in the drawing

Drawing WindowAssemblyD2.dwg has the steps done to this point

### Create the overrides using the pieces we just made:

We will first remove the mullion that goes through the door area with the Merge Cells command

In the right side viewport Select the window assembly RC>Cell Markers>1<sup>st</sup> Grid

This gives us the ability to select the infill pieces

Select the window assembly RC>Overrides>Merge Cells

Select the bottom cell as Cell A, Select the cell immediately above it for Cell B

This creates the space to put in the door

### Overriding the frames and mullions

Override the bottom frame - replace with threshold

Select the window assembly RC>Overrides>Override Edge Assignment

Select the edge at the bottom of the door area

Hit F2 to show the text screen. All the frame definitions are shown here. Each has a unique index number.

Type the index number of the threshold element at the command line.

### Override the Mullions to get them to move right or left.

Repeat: window assembly RC>Overrides>Override Edge Assignment

Select the internal vertical mullion to the right of the door area

Enter the index number for 'less 1x" mullion

The mullion shifts 1" to the left

Repeat for the mullion on top

Repeat using the Plus 1x to move the mullions on the left to over to the right 1 inch

### Override Cell Assignments to add doors and windows.

Note: after you add doors and windows, the door and window will be accessible directly in the drawing.

When you right click on a door, you will not get the window assembly shortcut menu. Make sure you select the window assembly not a door or a window after they are added.

### **Override the infill to add door**

Select the window assembly RC>Overrides>Override Cell Assignment  
Pick the cell marker where you want to place the door  
Hit F2 to see all the infill definitions in this style  
Enter the index number for the door type of infill

Repeat adding the window infills to the sidelights

Drawing WindowAssemblyD3.dwg has the steps completed to this point

### **Write the overrides into the window assembly.**

We need now to turn off the cell markers and save these changes back to the style  
Note...

Select Window Assembly RC> Infill>Hide Markers

Select window assembly RC Edit in place  
Select window assembly RC Edit in place> Save Changes  
In the Save Changes dialog box, make sure the style is 01Custom  
Pick all available check boxes Transfer Merge Operations, Cell overrides and edge overrides to style.

Pick OK

Done!

Drawing WindowAssemblyDone.dwg shows the completed drawing

# Mass Elements, Groups and the Camera

## Mass Element Basics

Mass elements are basic geometric solids  
 The elements may be added, subtracted or intersected. This can be accomplished either through the mass group, or directly with right click Boolean function.  
 May be 'extruded' or rotated AEC Profiles (read polylines with an attitude)  
 Can be 'grouped' together – see mass group

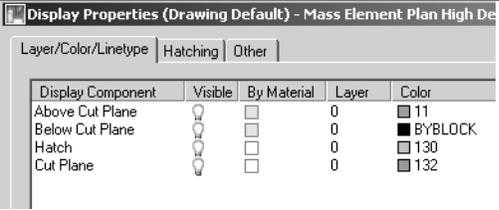
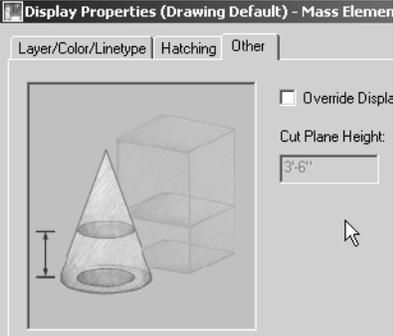
Practical applications:  
 Mass elements and groups can be used to design large commercial buildings  
 They can be used to quickly provide “background” buildings for renderings, or master plans  
 Can be used to solve problems such as niches, archways and things you just can't do with a wall object; custom shaped counter for an kitchen island, half a column etc.  
 as interference (subtractive) for walls  
 or as a modifier for walls

Drape Element; Draw the topolines at elevation and “drape this mass element over them to create a topo for Viz  
 Works best if Plines extend past bounds of mass element

Boolean; Right click on a mass element to add, subtract or intersect another mass element –no mass group needed.

## Basics

	<p><b>Properties</b></p> <p>Watch the add properties for specify on screen Yes or No</p> <p>You can assign mass elements to a mass group with the properties page</p>																		
<table border="1"> <thead> <tr> <th>Display Representations</th> <th>Display Property Source</th> </tr> </thead> <tbody> <tr><td>Model</td><td>Drawing Default</td></tr> <tr><td><b>Plan High Detail</b></td><td><b>Drawing Default</b></td></tr> <tr><td>Plan Low Detail</td><td>Drawing Default</td></tr> <tr><td>Plan Presentation</td><td>Drawing Default</td></tr> <tr><td>Plan Screened</td><td>Drawing Default</td></tr> <tr><td>Reflected</td><td>Drawing Default</td></tr> <tr><td>Reflected Screened</td><td>Drawing Default</td></tr> <tr><td>Sketch</td><td>Drawing Default</td></tr> </tbody> </table>	Display Representations	Display Property Source	Model	Drawing Default	<b>Plan High Detail</b>	<b>Drawing Default</b>	Plan Low Detail	Drawing Default	Plan Presentation	Drawing Default	Plan Screened	Drawing Default	Reflected	Drawing Default	Reflected Screened	Drawing Default	Sketch	Drawing Default	<p><b>Style</b></p> <p>The style of a mass element is used mostly to control material assignments or hatch assignments in the drawing</p>
Display Representations	Display Property Source																		
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Display Component	Visible	By Material	Layer	Color																						
Above Cut Plane	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	11																						
Below Cut Plane	<input type="checkbox"/>	<input type="checkbox"/>	0	BYBLOCK																						
Hatch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	130																						
Cut Plane	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	132																						
	<p><b>Display Rep Plan</b></p> <p>If needed override the cut plane in the plan representation</p>																									

## Adding

### Tool, RightClick > Apply to:

Only another mass element – Apply the tool properties to a mass element in the drawing

### Pick points

How a mass element is added to a drawing is determined by the specify on screen option in the properties page.

Specify on screen = yes, pick two corners a height and a rotation

Specify on screen = no, pick insertion point and rotation

### Other

Right click on any closed polyline, RC > Convert to > Mass Element  
Creates mass element from polyline

## Modifying

### ACAD modifying

Standard Grip stretch OK

Trim is not supported and will often break the mass element leaving only 2D lines – use RC trim

### RightClick Tools

Boolean>: Union to create one mass element from 2. Subtract will prompt for the objects to subtract from the selected mass element. Intersect, just leave the common overlapping areas of the two mass groups  
Trim = pick two points and the side to remove, or you can specify 3 points if you want to trim out of plane.  
Convert to wall. This command does a 3D body modifier in one swoop.

### Etcetera

#### Internal Nodes

Mass Elements have a node at the center of the shape at the top and bottom. Use this node to help place mass elements stacked on top of one another

#### Mysterious

Less than documented command to change a 3d element (solids) to a mass element  
Change a 3d element (ACIS solid) to a mass element. Type `masselement` at the command line, then type 'convert' at the command line. Provide the element with a name, and you have a mass element in your drawing based on the solid you chose. You now have all the controls you have with a normal mass element, put it in a mass group for subtractive/additive functions, or anchor it to grids, Use it as an interference condition for walls etc.

While ADT04/05/06 has the ability to convert a closed polyline directly to a mass element, you may find it useful sometimes to use the extrude command at the command line or off the solids toolbar (load ACAD menu)

Create an ACIS solid by drawing any closed polyline and "extrude" it.

Use extrude along another pline pick path instead of giving it a distance to extrude.

#### Used to be little known

Mass elements have the ability to display hatch. This is turned off by default R3, on by default R4. Masses are style based. You can create different styles to hold different hatches for like mass elements

### Mass Groups

#### Basic

The operator on the mass elements. Acts as the non destructive Boolean logic visibility cloaking device

Boring by itself – it just appears as a marker until you right click and attach other objects to it

Used to make one thing out of many masses or other objects

The only thing that shows the result of making the properties of a mass element additive, subtractive or interfere

#### Adding

Just add from the massing palette

#### Right Click > Model Explorer

This is a very slick interface for working with Mass Elements and Mass Groups. Within this in

Add elements, groups

Modify elements/groups

Copy and rearrange elements

This is the only way to rearrange mass elements once assigned to a mass group. Boolean logic (add subtract, interfere) is VERY dependent on the order as it shows up in the Model Explorer.

Elements will only operate on elements above them in the tree. Drag elements in the tree with the left mouse button.

#### Slices

Are converted to space boundaries (which act like fake walls). Space boundaries are then converted into walls.

Or you do the mass model for looks and a quick study in VIZ. Then you draw the walls and skip all the in between.

Alternative 458:

## Building Objects

Put your mass elements in a group  
Assign slices to the group

Convert the slices to polylines and the polylines to walls....

### Camera

Easy and fun...when creating a walkthrough, there used to be a glitch that only one viewport could be in the layout or the avi would be empty – I have not checked this for R4

## Slabs and Edges for Roof and Floor

Slabs and Roof Slabs are twins, it is just that one got the upper bunk. The controls for creating them in the drawing are the same, the options for modifying work for either one. The only real difference is that you can convert a roof directly to roof slabs with a right click.

If you have drawn spaces you can convert them to slab by right clicking the slab tool and “apply to space”

### Basics Roof Slabs

Go as far as you can with a roof  
Then only if you really need to, convert it to a roof slab

### Properties

#### Style

Styles for roof slabs and floor slabs were overhauled considerably. Roof and Floor slabs now work much like walls in that they can have multiple components. Everything from the walls exercise applies.

#### Display

Be aware of where the cut plane is (is there a style override) and if a material is controlling the surface and cut (section) hatch of the slab

### Adding

**Tool, RightClick > Apply to:**

**Pick points**

**Other**

### Modifying

**ACAD modifying**

**RightClick Tools**

Shift, Alt do different things on grip stretch

### Slab or Roof Slab Edge Style

2 Profiles goes into Roof Slab Edge Style (facia and soffit) which goes into Roof Slab tool properties. Insertion point is critical for these profiles – see the image in the edge style for the location expected for the insertion point of the profile.

### Etcetera

Bpoly to create  
Edges override, will be the same as roof slabs

# Spaces

**(formerly Areas and Area Groups)**

OK, there is too much information here for a basic class, Spaces received an overhaul in the 2007 release. The skinny of this is that they too a fairly simple object (space) and replaced a complex object (area and area groups).

**Way Finding within spaces:**

Spaces are a very useful tool in the Architectural Desktop toolkit. However, because there are so many parts and pieces involved, it is easy to get lost.

**Systems Thinking:**

Any time I have a new piece of software that I try to understand, I first attempt to apply systems thinking to the objects involved. Systems-thinking involves breaking down the components into a Kit of Parts and a Set of Rules. 2007 spaces are no exception, and fit into this thinking very well. The organization of this class follows this system based thinking

**Kit of Parts:**

2007	2004, 05, and 06
Spaces (Styles)	Areas
Zones (Styles)	Area Groups
Calculation Modifiers	Calculation Modifiers
Zone Templates	Group Templates
List Definitions	Name Definitions
Property Data Formats	Property Data Formats
Space Evaluations	Area Evaluations
Schedules and tags	Area Schedule and Tags

**Set of Rules**

While there are no set rules concerning the order in which you do things... you can start with spaces and then add the zones or start with zones and then add spaces...

You can start with spaces as a predesign tool adding spaces as simple placeholders to do participatory adjacency analysis or you can do the schematic design and then add the spaces later, but...

- Add spaces to the drawing
- Use List Definitions for consistent naming of areas
- Add Zones
- Use Zone Templates for consistency
- Apply Calculation Modifiers as needed to spaces and/or zones
- Attach the zones and spaces together in logical order
- Create Space Evaluations and/or Schedules
- Area Evaluations Kit of Parts:

Drawing Objects  
Space  
Zone

Style Tools  
Calculation Modifiers  
Zone Template  
List Definitions  
Property Data  
Formats

Query Tools  
Space Evaluation  
Schedules

# Building Objects

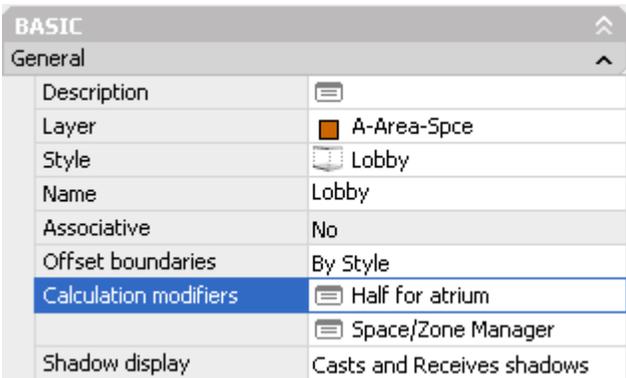
The Kit of Parts for the Area Evaluation consists of two drawing objects, four style based tools or modifiers and two different ways to query the information held by the areas:

## Space

The Space object is the foundation of the Space evaluation (an export to excel). This is the object that holds the area and perimeter reported in the evaluation.

Spaces can either be additive or subtractive, or combinations thereof.

## Basics



### Properties:

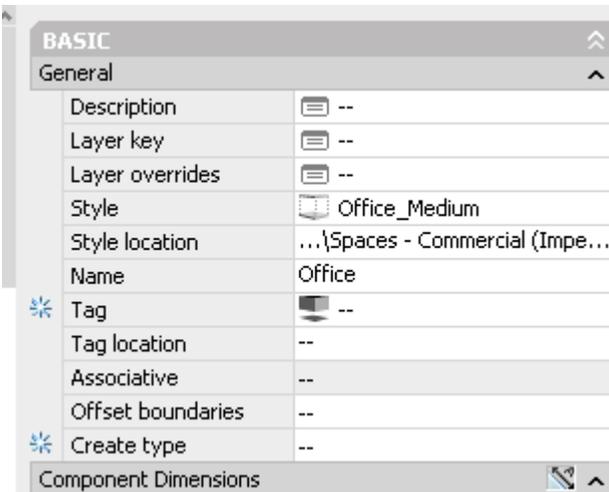
The properties of a space contain the standard AEC object information such as the Name, the description, layer and style. Particular to the space are the ability to assign a Calculation Modifier to the area, or assign the space to a specific area group.

Also the properties alerts you to the associative status of the space (is it aware of the surrounding walls?)



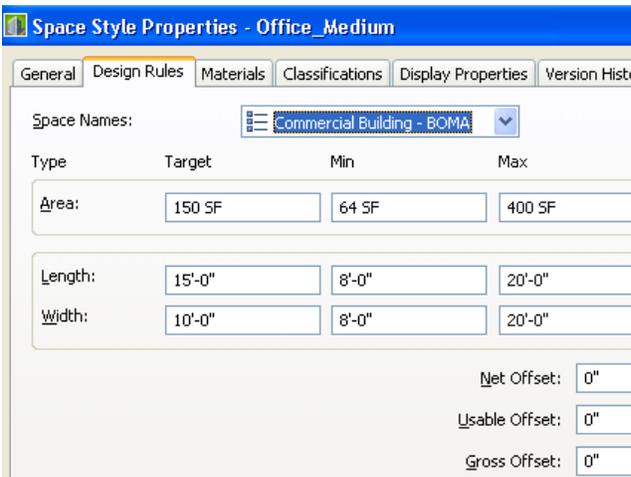
### Palette Tool Right click:

With a right click on a space tool you can launch the autogenerate routine or convert a slab directly to a space object



### Palette Tool Properties:

The palette tool provided for Spaces hold just the same information as the ACAD properties page, but allows you to set layer key, or overrides as well as set an external location for a tag that will be added with the space



## Space Styles:

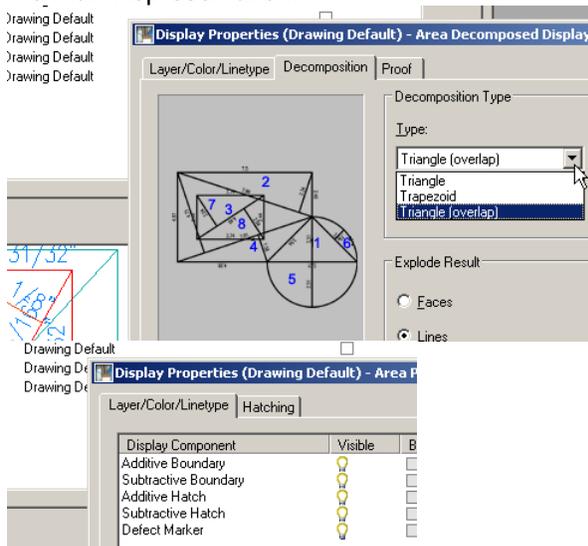
Two important ideas are held in the space style. The first is the Space Name. This screen capture shows “Commercial Building Boma” This is a list definition. It’s purpose here is to keep the space names consistent (ie corridor always and never hall – or vice versa). Also on this tab are the default net usable and gross offsets base by style.

I find it useful to have a couple different styles handy in the templates to control hatching.

## Display:

More is told about the Space object by looking at it’s display properties:

There are two main display representations for the area object, the Decomposed Representation and the Plan Representation.



The Decomposed representation displays on screen the method for calculating the area of the space. This representation is useful for back-checking area calculations and is required in some regions to be submitted as proofs for building permitting purposes.

The Plan representation is used in one way or another for the remainder of the representations for the Area object. The plan rep allows you to control the hatching and color of the boundary differently.

Note the space object is 3 dimensional as viewed in isometric mode it consists of a floor and ceiling plane.

## Adding

There are many different methods for adding spaces to the drawing.

Use the tools to add spaces prior to any walls as a space planning exercise

Use the space Auto Generate tool to add spaces into a drawing that already has walls in place

### Tool, RightClick > Apply to:

As with other ADT objects you have several more ways of adding areas if you right click on the Area tool and select Apply To...With the Area object you have three choices in the apply to flyout and each gives a slightly different set of subcommands. You can apply the area tool to Areas, Linework and AEC Objects or Auto-Detection.

### Apply to: Spaces

## Building Objects

When you apply tool to Spaces, it just takes what ever setting are in the tool properties (not the ACAD properties) and applies them to the existing space(s) you choose in the drawing. This includes style height etc if set in the tool properties

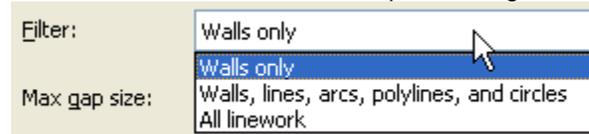
### Apply to: Linework and AEC Objects

is for polylines and space objects. You can use any other AEC objects, such as a roof, to get the space of a dormered area at any given height, but in general, I find the space object may already exist, and if I want the functionality of the areas, it is just a few steps away. This is NOT the command to use on walls, that command is..

### Apply to: Auto-Generate

When you use this command it behaves much like a hatch. Be careful that you are zoomed to the extents before launching the command. If you are zoomed into a single room it probably will not find the boundaries if you zoom out after you launch the command.

Also be aware that there are 3 options for generating spaces



Of these I use Walls Only about 98 percent of the time.

If this is set to Walls, Lines, Arcs, Polylines and circles, heads up that it may take a \*Long\* time to find all the possible borders in the drawing.

### Tool, RightClick > Style

Just opens up the style manager filtered to the styles available in the drawing.

### Some tips:

You can get polylines by changing to the reflected display configuration, setting the cut plane above the windows and doors, turning of the ceiling layer if there are ceiling grids and then using the BPOLY command to pick the rooms in the plan.

If your walls are center justified you can use the diagnostic configuration to snap to the graph lines of the walls.

## Modifying

### ACAD Modifying

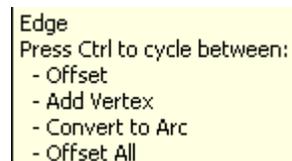
Copy, cut, paste functions all work fine. However if you need to cut one do not use the standard ACAD trim command, use the trim or divide off the right click menu instead.

### Grips.

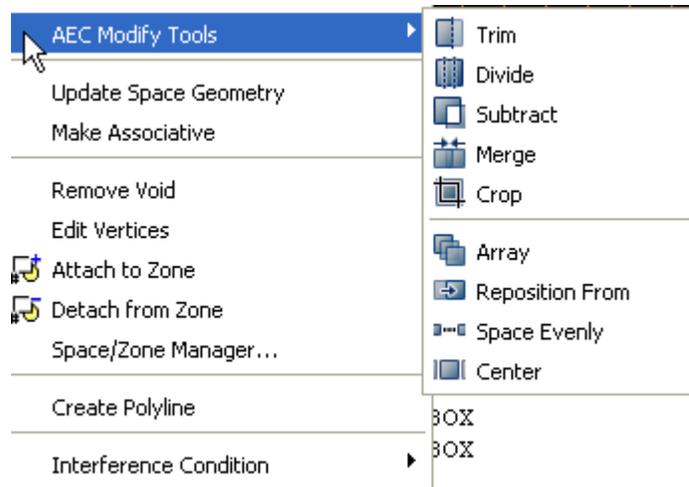
Standard grip stretch functions apply – no special grip stretch like slabs or stairs. If you need more points, use the Right Click > Edit Vertices and watch the command line for

*Pick vertex to add or shift-select to remove:* to allow you to add or remove vertex points.

The side grips have the added ctrl functions:



### RightClick Tools



Once the basic spaces exist in the drawing you can use the right click menu commands to modify them.

Join will make two separate areas report as one value – even if they are not touching.

Subtract will make a subtractive area inside the selected area. The subtracted area will be taken away from the area.

## Zones (formerly Area Groups)

Zones are the way to collect Spaces together to sort and organize the Spaces in the building. If you are using the Evaluations, you can then pick and choose which Zones to include or not include.

Groups styles can be defined to be able to include other groups.

## Basics

### Properties:

The Properties of the group are not that different than those of the Space.

Of note is the Use Name Definition. This lets you assign a name definition for all Spaces in the group. A Name definition is just a list of names. This is handy if you have clients or building departments that want a consistent naming convention and a storage area is not Storage on one plan, Closet on another and Unoccupied on a third.

### Palette Tool Properties

The Zone Tools are again not that different from the space Tools, but you can assign a name definition to the Zone as it is created. That is enough reason to perhaps copy this tool on the palette.

You can also tag groups if you want to, I have not found any reason to create one but I guess

### Zone Styles:

Also like Spaces, there is not much in the group style other than classification and display control

### Display:

There is more in the Zone Display than anywhere else. Again, mostly in the plan display. The default settings are fine for most things, but you should understand what the subcomponents are.

## Plan Representation

## Building Objects

Entity is the small box along with a surrounding line on all Spaces that are assigned to the group.

Hatch if it is turned on will hatch all Spaces assigned to the group – only if the “Entity” is turned on. Otherwise it will hatch only the small marker that is the handle of the group.

The Space and Group Connection lines will just show a visible link between the attached parts and pieces.

The Other tab of the plan display controls how the text appears next to the groups

## Adding

When you add a Group, you are only adding a marker. For those of you familiar with Mass Elements and Mass Groups, the idea is the same. An Zone is nothing without something attached to it.

You can add entire hierarchies of groups at one time using the Zone Templates – see below.

## Modifying

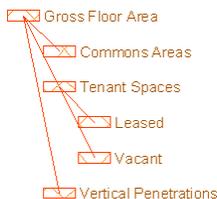
There is not much to do with ACAD to an Zone except move, copy and paste and all these work fine.

## RightClick Tools

Right click tools are pretty limited to attaching or detaching Space and Zones from the selected group. The Zone Layout will just modify the location of the group in the layout.

## Zone Templates.

Group Templates are just a collection of Zone Styles stored in yet another style.

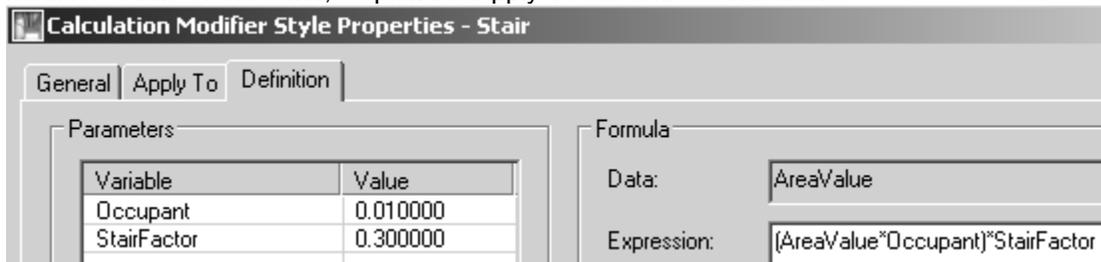


Within the Zone Template style definition, you can Add, rename and delete groups by right clicking on a group in the left pane of the dialog box. (not obvious, but reinforces the idea “When in doubt, Right Click”).

When you add an Zone Template, all the Zones are added at once ready to use (assign Spaces to).

## Calculation Modifier Styles

A Calculation Modifier is a mathematical expression you can assign to an Space or Group in its properties page. Assigning a calculation modifier will let you pull two values from the Space. The Base Space which is the sum of all the additions and subtractions of the Space and the Calculated area which is the result of the function you have assigned via the Calculation Modifier style. When you create a Calculation Modifier style you can decide to apply this to the perimeter or the area of the object (Space or Zone) If you leave both of these selected, you will see the Data on the right just read Value. Normally you will be creating a modifier to one or the other, so pick the Apply To tab and set that first.



## Building Objects

This is an example of a Calculation modifier you could apply to gross occupied area to get the value for the width of stairs. The function takes the base area (applies to area not perimeter) and then assumes an occupant load factor of 100 SF / occupant. The

Rules:

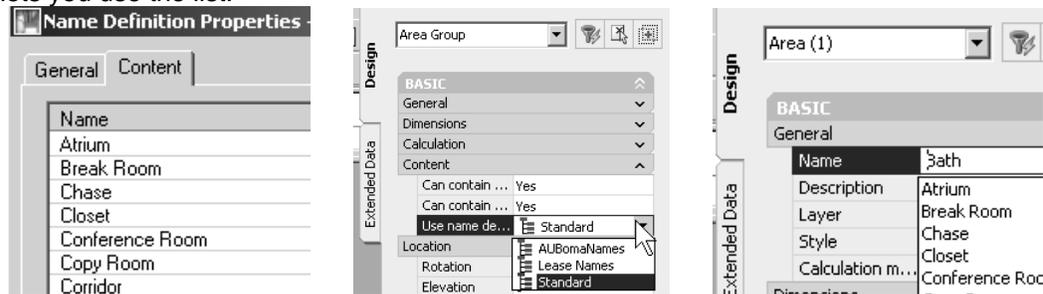
When you add a variable on the left, you can use it on the right. As you enter the value of the Variable on the right in the expression, this is CaSE sEnSiTiVe. Otherwise any expression you create will be applied to the area. Simple expressions using + - / and \* are fine.

Odd:

You can only have one calculation modifier per space or Zone. While at first limiting it is easy to copy Spaces and groups if you need more than one kind of modifier.

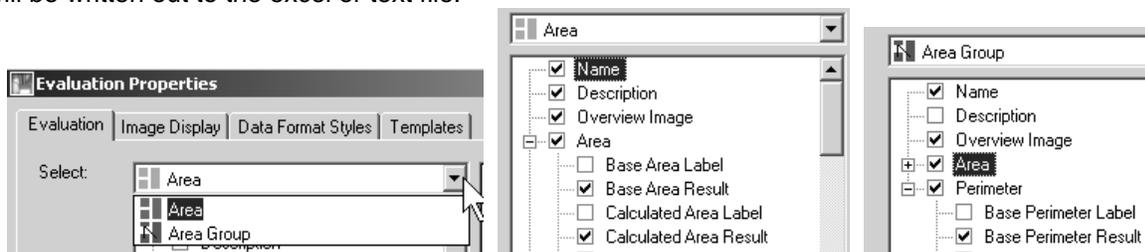
## Name Definitions

A name definition is just a list of names that make naming the Spaces assigned to a particular group consistent. A name definition is assigned to an Zone in the properties page. Once assigned, any Spaces that are attached to that group will have the drop down appear and list those names. This functionality will not prevent you from typing in a name that is not per the definition, but just provides the drop down that lets you use the list.



## Space Evaluations

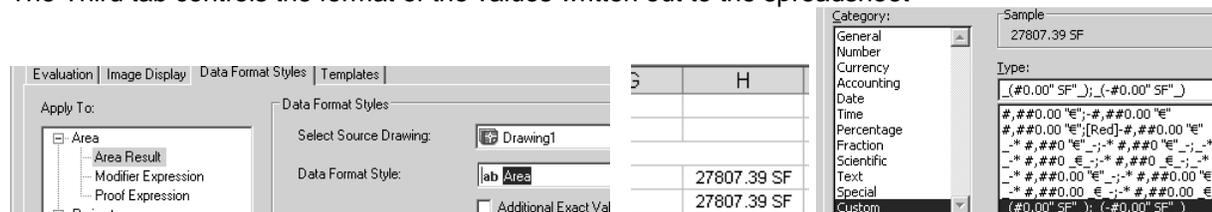
OK, all of that is fine, and all the parts have their place in creating the Space Evaluation. The Space Evaluation tool is on the same documentation palette as the Space and Zone tools. When you pick this tool, a new dialog box pops up that allows you to get visual feedback concerning the Spaces simply by selecting them on the left. Here you can isolate what Spaces and groups you want to write out to the excel sheet. The evaluation Options tab on the lower right controls how and exactly what the information will be written out to the excel or text file.



You control the Information for both Spaces and Zones here, selecting if what parts you want to include in the evaluation: The Name, Description (from the Properties), A small bitmap image of the Space or Zone and what details about the Area or Perimeter to you want to push out to the excel sheet.

The Second tab just gives you control over how you want the images to be captured – you can set Display configurations that have solid shading so you see a solid image (use Presentation Configuration if you want this – already standard in the ADT templates).

The Third tab controls the format of the values written out to the spreadsheet



## Building Objects

Here you assign a Property Data Format that controls how the value will be formatted in excel. While this is nice if the excel sheet is the end product, formatting cells beyond a simple number can be painful if you need to manipulate these values later.

The last tab is the template that will be used by the evaluation function. The templates for the evaluations are stored in a subfolder of the standard template folder.

C:\Documents and Settings\All Users\Application Data\Autodesk\Autodesk Building Systems 2004\R16.0\enu\Template\Evaluation Templates\... there are several for both text and excel format evaluation.

If you cannot access (it is grayed out) the evaluation export buttons at the lowest right, it is because you have not assigned a template yet. Pick the export button and voila!

## Space Schedules and Tags

While the Space evaluation is useful, there are times when you cannot get the base functionality to do everything you want to do, and other times when you want to keep the information in the drawing instead of an Excel sheet. In 04/05/06 the schedule table got a very thorough working over and you can now do quite a few things with the schedules that compliment the Space and Zone evaluation function.

Schedule Table				
Name	Project Level ID	Base Area	Occ. Fact.	Occupants
Main Lobby	?	2025.27 SF	300	6.751
Corridor	?	1976.88 SF	300	6.59
Tenant Space	?	15568.02 SF	100	.15568
Tenant Space	?	3248.07 SF	100	32.481
Restroom	?	884.74 SF	300	2.949
Tenant Space	?	2546.99 SF	100	25.47
Stair	?	266.40 SF	100000	0
Elevator	?	180.42 SF	100000	0
Copy Room	?	199.95 SF	300	.666
Chase	?	109.51 SF	300	.365
Electrical Closet	?	324.36 SF	300	1.091
Stair	1	219.89 SF	100000	0
Stair	?	256.90 SF	100000	0
				232.034

This table shows how that you can do other things like establish your occupant load factor using Spaces

This table is set up like this:  
There is a property set definition OccupantsStyleBased that looks like the image on the next page

Name	Description	Auto...	Type	De...	Format
BaseArea	Base Area	Yes	Auto...		Standard
OccupancyFactor	OccupancyFactor	No	Real	0...	Number - 0
OccupancyLoad	[BaseArea]/[OccupancyFactor]	Yes	Formula		Standard

I made this style based assuming I would create Spaces that were close enough to assign a variable OccupancyFactor and store that value in the style of the Space. I made this just a manual property so that it can be manually set from style to style.

The BaseArea is just the area of the Space object. I did not use the one already provided because this value already has a property format of BOMA Area. This property format applies the NAU prefix and SF suffix to the number and I find that I like to keep numeric values straight forward in case I need to use the value in a Formula property (as I do here). applies to Space styles that has two values in it.

The Formula is as per above assuming the base area will be divided by the occupancy factor.

Some notes on Property formulas:

You will get odd values in the schedule if the occupancy factor value is not set (or 0) once all the styles get assigned a numeric value for the OccupancyFactor things will be set fine.

If you are doing complex formulas, you must use the buttons on the property creator, you cannot just type this in. I have found that this is very finicky and that sometimes it is easier to recreate an entire property rather than modifying an existing formula.

	Name	Project Leve...	Base Area	Occ. Fact.	Occupants
Property Set	BOMA_AreaSt...	AreaObjects	OccupantsStyl...	OccupantsStyl...	OccupantsStyl...
Property	Name	Level	BaseArea	OccupancyFa...	OccupancyLo...
Format	Standard	Standard	Area	Standard	Standard
Example	0	0	SF	0	
Total	No	No	No	No	Yes
Hide	No	No	No	No	No
Matrix	No	No	No	No	No
Max Cols.					

## Building Objects

This schedule definition looks like this. Even though I keep the raw data that exists in the property definition as a number, I have no hesitation to reformat that value in a column in a schedule. Here the OccupantsStyleBased:BaseArea –is Standard as set by the property, but overridden as an Space property format in the table that gives me the SF at the end of the value.

### Other thoughts

There are two ideas promoted by about how to use Spaces and Zones Top Down and Bottom Up. Top Down means you put the groups in the drawing first via a Group template. Assign Name Definitions to the Zones And then assign the group as you add the Space (properties page) so you have access to the name definition list. While this allows you to take advantage of the Name definition list, I find this way annoying. I prefer to make all the Spaces I need and then assign them to groups as makes sense. I like this because when I am putting Spaces into the drawing, I find it easier to do If there are not a lot of other selections getting in the way of grip stretching. – yes I can get rid of the groups with display control, It is purely personal preference.

### BOMA CALCS:

Before I say anything about BOMA Calcs – I must say get the publication. This is a legal document and any terms I use in this paper or in class, must default to the definitions outlined in the official BOMA document. Interestingly – you cannot download this from the BOMA site directly but must order it – but if you go to the ANSI site you can download it in PDF format. OK that disclaimer done...

I like to have one group template that has the following Zones in it. Rentable, Usable and Building Common. You will need these areas of the building to create the BOMA calc and get the Rentable to Usable ratio, so it makes sense to me to have a group template already set up to show these values.

I also like to have my group styles hatched differently and hatch turned on so I can see what they are doing in the drawing readily

As much as I would like to have the schedule object do everything in the BOMA calc for me, I cannot see a way to have the schedules even with the formula based property set do the kind of calculations BOMA requires without doing a bit of VBA coding which I don't do. Basically what you need it to is look at all the subset of attached groups and select one and divide its area by another. (or in terms of scheduling, take a value from one object and operate on that same value of another object.) Regardless, this is fairly painless to do in Excel if you watch your property Data Formats and are not sending a bunch of format code to the excel file. Set the Spaces and Zones up in a way that makes sense and then use the schedule function to push the data (Rentable, Usable and Building Common) for all floors of a building out into and excel file. Create a couple function cells and you are done.

Be creative in your use of objects when you are generating your Spaces – use the bottom view to get the sketch representation of the walls. Use the reflected display config and use Bpoly to generate polylines, adjust window and door/window assemblies to get a single line so you don't have to draw around all the windows.

Building Systems:

Use the Spaces and Zones on the 2D elevations to quickly find the area of wall/glazing.

Apply a calculation modifier to the floor area to give you rough energy calcs based on watts/sq ft.

### Creating an Occupancy table

The following was written for the 2004 software it still mostly works, but anywhere you see Area object think space and where you read Area Group – think Zone

Per the student's requests in the class, this section has been added to the original handout

For a dataset you can use either my dataset, or any drawing with a couple areas it in that are different styles. – You will be using the styles to assign the occupant/SF variable, so make the area styles names make sense with the occupancy table.

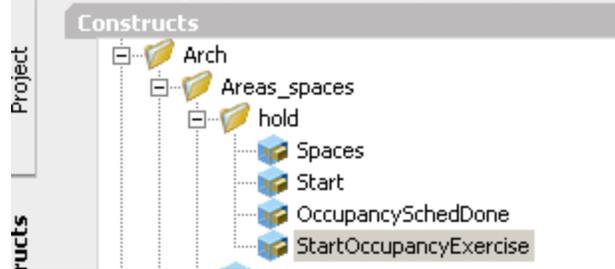
Just one last note:

I am using Autodesk Building Systems to create these datasets. I have been as careful as I can be about not populating these drawings with anything from ABS. I have hacked the registry so these modules do not load. However, I cannot test to see if there is anything in them. If you get a proxy message about ABS

## Building Objects

not loaded on your machine, be careful with the drawings, and don't copy parts from these drawings into your working drawings. I hope this will not be the case, if it is, let me know and I will need to recreate these from scratch. This is not a major disaster, it is just a display representation that ADT does not understand. There are no Objects from ABS in these drawings.

If you are using my dataset, then open the project navigator



Start in the StartOccupanceExercise Drawing. The OccupancySchedDone has the end result of the exercise in it.

Schedule Table				
Name	Project Level ID	Base Area	Occ. Fact.	Occupants
Tenant Space	1	3248.07 SF	100	32
Tenant Space	1	15568.02 SF	100	156
Corridor	1	1976.88 SF	300	7
Restroom	1	884.74 SF	300	3

There are four main steps to creating this schedule table.

Create the Property Set Definitions

Create the schedule table style

Apply the property sets (Add the schedule data)

Add the table to the drawing.

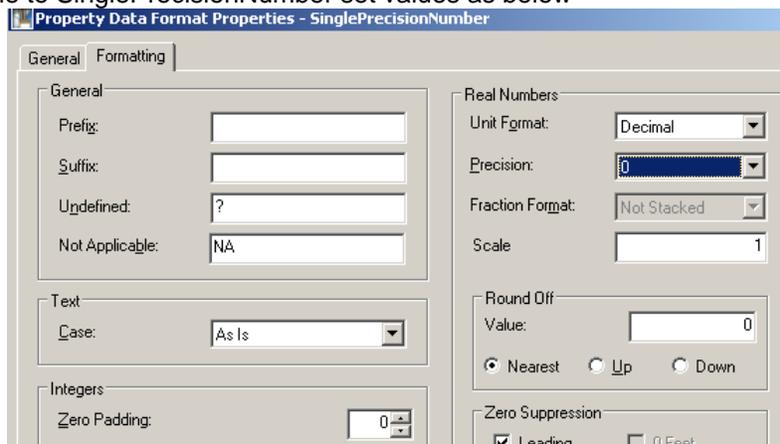
### Create the Property Set Definitions and Data Formats

There are 5 columns in the schedule table, so we will need to make or find 5 property sets to create the schedule. I have inserted the Area & Zone Styles - BOMA (Imperial).dwg from the styles folder in the content directory ... enu\Styles\Imperial so I already have some property set definitions to work with that apply to areas and Zones. The others I will create here.

Open the StartOccupancyExercise.dwg from the project navigator.

Format>Style manager>Documentation Objects>Property Data Formats

Create new, rename to SinglePrecisionNumber set values as below



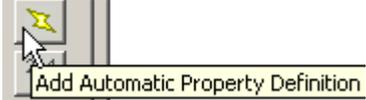
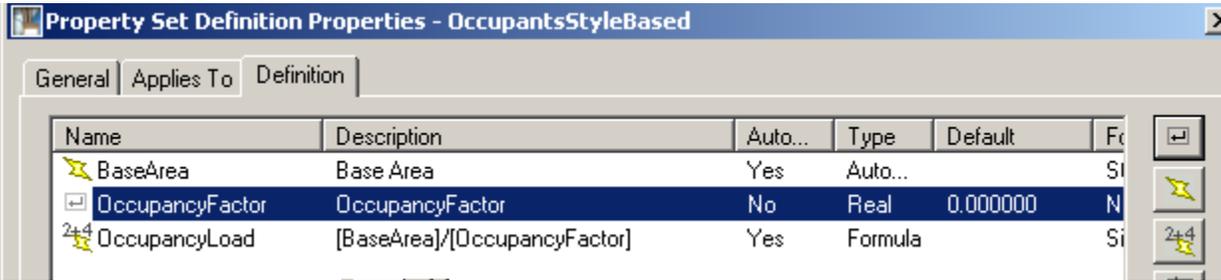
You may want precision to 0.0 – but I am putting it to 0 to show what I skipped in class. Normally for my building department I would show 1 decimal point.

OK back to style manager.

Move down to the next category, Property Set Definitions

Create new, rename to OccupantsStyleBased

Pick Applies To, make it apply to Styles, and only Areas

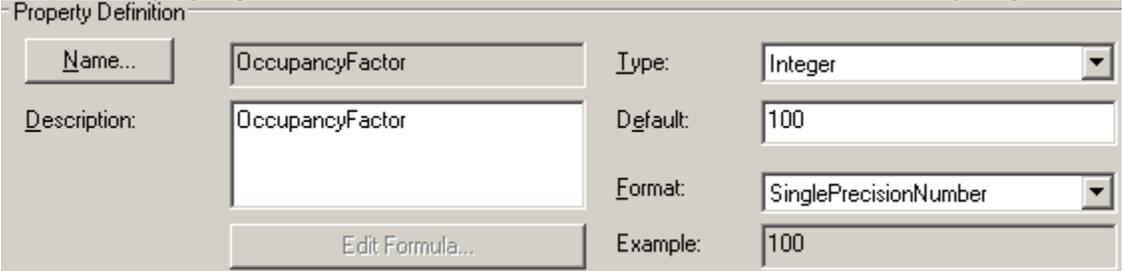


Create new property with the **Add Automatic Property Definition** button, Set source to the BaseArea. Use the default name BaseArea. – let the format of this stay at standard so you can have a few decimal points to work with.

If you have inserted the BOMA drawing noted above, you will already have a BOMA\_AreaStyles with this value, but it is formatted differently. I like to keep my PropertySetDefs and such separate for different uses, so I just create a new one here.



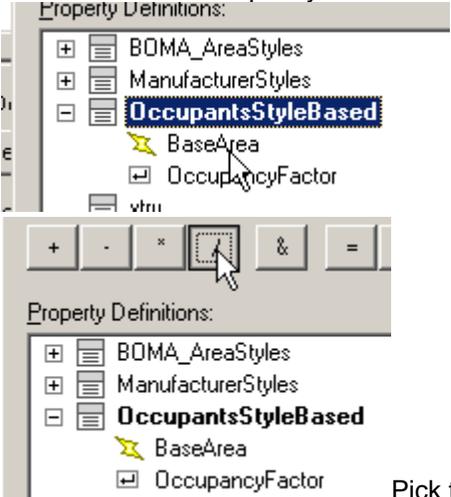
Add another property - manual **Add Manual Property Definition** and name it OccupancyFactor.



Set the Type to Integer and the format to SinglePrecisionNumber (could be Standard as the format is integer should keep the decimal points at bay) – set the default value to 100.



Add yet another Property using the formula based property definition  
Rename this to OccupancyLoad



pick OccupantsStyleBased>BaseArea

Pick the / symbol,

Pick OccupantsStyleBased>OccupancyFactor

Should look like this:

Formula:  
**[BaseArea]/[OccupancyFactor]**

do not type these in, picking the property below and the / from the toolbar establish functions and relationships that are behind the scenes that you will not get from typing these values in.

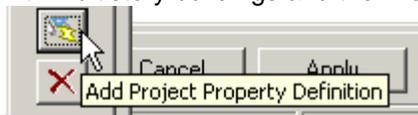
Also – a side note – I have found that if I need to modify a formula based property sometimes the formula stops working. If I recreate it from scratch, it will work. I think this has to do with some of the behind the scenes functions getting left in the property even after I have erased or replaced something in the formula, but cannot quite be sure, I have not tracked this down.

OK back to the property set definition properties (not style manager) and set this formula based properties format to SinglePrecisionNumber

Add another Property (automatic) and select Name as the property source, set the format as Case Upper if you have it in your drawing otherwise leave it as standard. – I do this because the name might be different than the style. For example the style might be “OfficeSpace” and get the 100 SF/Occupant factor, but there may be Admin offices, Open Offices and other individual areas with different names of the same style, but will all have the same occupancy factor.

– Note that you are pulling a property from an individual area, but are applying the property to the style based property set. This is OK, and I do this often, as well as working it the other way – you can pull some information from a style into an Object based property set if needed (for a “type” schedule for example).

If you are mostly working with multistory buildings and the Project Navigator, Add Another Property using



the Project based button ... Select Level ID as the source.

So, backcheck, the Property Definition should look like this, more or less

Name	Description	Auto...	Type	Defa...	Format	Example
BaseArea	Base Area	Yes	Auto...		Standard	
Floor	Project Level ID	Yes	Project		Standard	
Name	Name	Yes	Auto...		Case - Upper	
OccupancyFactor	OccupancyFactor	No	Integer	100	SinglePrecisionN...	100
OccupancyLoad	[BaseArea]/[OccupancyFactor]	Yes	Formula		SinglePrecisionN...	

OK,OK back to the drawing and save because you have done a bunch of work and don't want to lose it.

## Create the Schedule Table Style

Format>Style Manager>Documentation Objects>Schedule Table Styles

New, and rename to Occupancy Table, RC>Edit

Applies To tab... Clear All, select only Area

Columns tab:

Pick Add column, select OccupantsStyleBased>Name (if you are using my dataset you have to scroll way down the list). Heading and Data Format are fine as is, OK back to table style properties

Add columns OccupantsStyleBased>... Floor and Base Area – just as they are, no change to heading or data format.

Add column OccupantsStyleBased>>OccupancyFactor, change heading to SF / Occupant (with spaces). Pick the Override Cell Format and put a value of 1.25 in the Fixed Width Column to force the header to word wrap.

## Building Objects

Add Column OccupantsStyleBased>[BaseArea]/[OccupancyFactor]. Change heading to Occupants and pick the Total check box below the override button.

Verify this format is set to SinglePrecisionNumber.

You could have left the format for property [BaseArea]/[OccupancyFactor] as standard, and then overridden the property here in the schedule if you wanted. The important thing is to have all the values used in the formula based property as the same type of value so [BaseArea] will return a REAL number (decimal) and [OccupancyFactor] is set to Integer, so dividing these should not be a problem, but will return a REAL number which then you tell the property Occupant load to reformat as a SinglePrecision. You want to make sure that you don't take a value like Base Area out of the BOMA – NRA property set because it has a different property Format that includes a Character prefix and suffix and will present data to the formula that it will not understand.

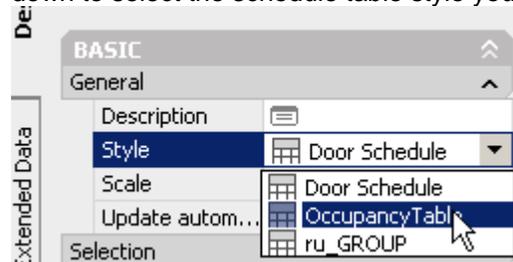
While you are in the style manager drag the schedule table style onto a toolbar – this will only be useful for this drawing, but creating tools is a completely different lesson.

OK back to the drawing and Save

### Add the schedule table

Change to the model tab layout (so you have the Medium display configuration and can see the schedule)

If you did not make a tool, Hit the door schedule tool, then move over to the properties and use the drop down to select the schedule table style you just made.



Type ALL at the select objects prompt, place the schedule table

Everything is ? because the Property Set Definition has not been applied to any of the Area Styles in the drawing

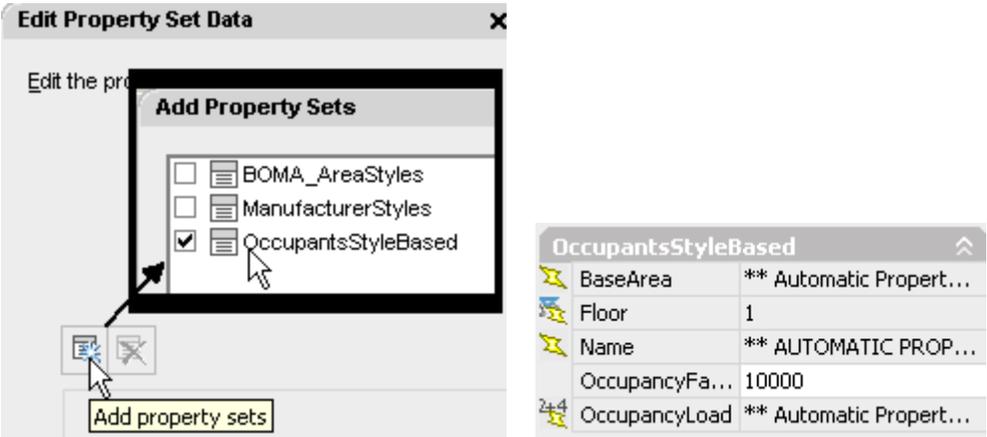
### Apply Property sets to all Area Styles

You can do this from the drawing by right clicking on each space and choose Edit Style off the pop up menu, but I will do this in style manager because it is faster.

In style manager, expand documentation objects and Area Styles.

Pick the Vertical Area Style, RC>edit

On the general tab, pick the property set button and then the add button



pick the Occupants Style Based and then change the OccupancyFactor to 10000. I do this to make this essentially an Accessory space that will return a 0 for occupants and does not get included in the Occupancy calculation. – repeat this for the Corridor and OfficeCommon Area Styles - Bathrooms and other non-occupied.

OK, this dataset was set up for the BOMA calcs and not necessarily with the styles I would use to do this, but you get the picture.

Repeat for the OfficeArea style giving it a 100 Occupancy Factor

Repeat for BuildingCommon, giving it a 300 Occupancy Factor

OK back to the drawing, select the schedule table RC>update – id should now look something like...the image on the next page.

Schedule Table				
Name	Project Level ID	Base Area	SF / Occupant	Occupants
TENANT SPACE	1	2546.99	100	25
TENANT SPACE	1	15568.015	100	156
TENANT SPACE	1	3248.074	100	32
RESTROOM	1	884.743	10000	0
COPY ROOM	1	199.948	300	1
MAIN LOBBY	1	2025.269	300	7
CHASE	1	109.511	10000	0
ELECTRICAL CLOSET	1	324.363	300	1
CORRIDOR	1	1976.882	10000	0
ELEVATOR	1	180.417	10000	0
STAIR	1	219.885	10000	0
STAIR	1	256.896	10000	0
STAIR	1	266.396	10000	0
				223

## Structural Grids (and Ceilings)

- Anchor grids within grids
- Grids can be clipped
- Grids have no true plan rep (watch osnap around the ceiling grids)

### Basics

Structural grids are limited, but then again, so is most of what we do as architects with grids.

### Properties

#### Graph lines and clean up radius

#### Style

#### Display

### Adding

Tool, RightClick > Apply to:

#### Pick points

#### Other

### Modifying

#### ACAD modifying

#### RightClick Tools

### Etcetera

- Anchor grids within grids
- Ceiling grids can be clipped
- Ceiling grids have no true plan rep (watch osnaps around them)
- SN will center the grid in the space – after you pick set boundary and the command is asking for an insertion point, type SN at the command line to center the ceiling grid. It will provide a default rotation based on the first segment of Polyline, or the space set to bound the grid.

Be aware that when you place a ceiling grid with a boundary, the grid may be larger than the space or polyline that creates the clipping boundary (It will most likely be larger) – grip stretch the ceiling grid to the smallest size you can get away with BEFORE you center it in the space.

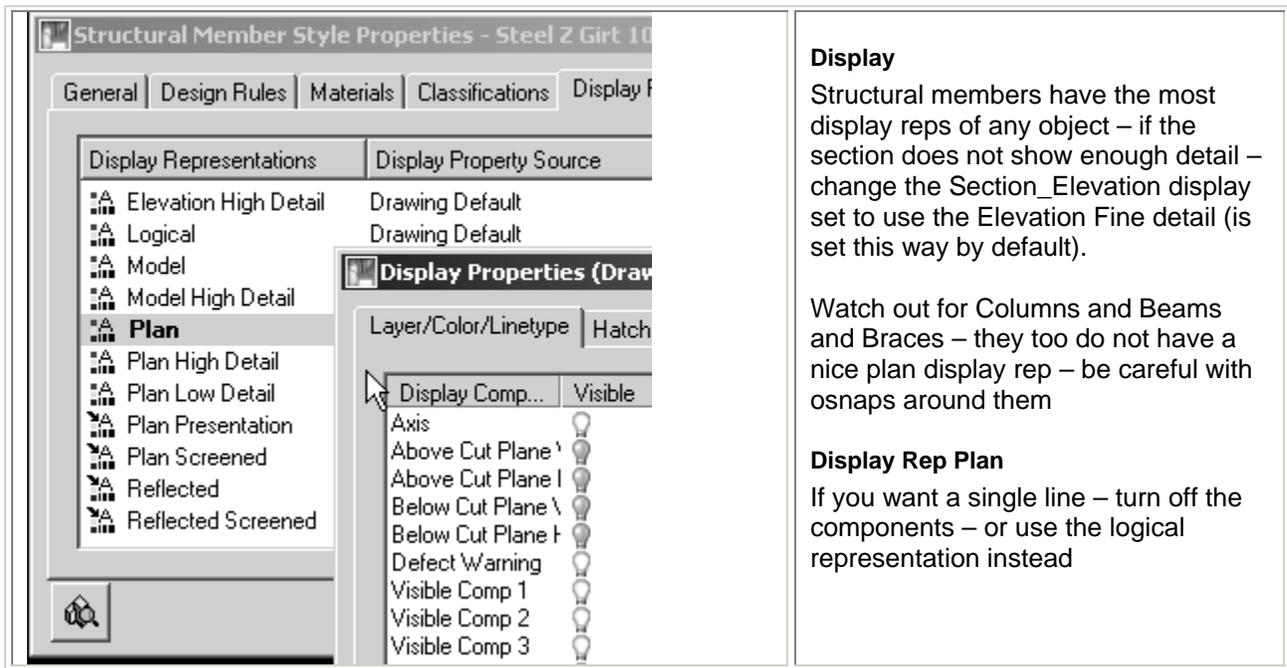
# Structural Columns, Beams + Braces

Each of these objects uses the same style – It is only how you add the object that determines the layer key and orientation of the object. – keep this in mind when you need to rotate them around a node on a structural grid.

## Basics

<p><b>BASIC</b></p> <p>General</p> <p>Description</p> <p>Style Standard</p> <p>Member type Column</p> <p>Dimensions</p> <p>A Start offset 0"</p> <p>B End offset 0"</p> <p>C Logical length 12'-0"</p> <p>Specify roll on ... Yes</p> <p>E Roll 359.63</p> <p>Justify Middle Center</p> <p>Justify using o... Yes</p> <p>Location</p> <p>Rotation 90.00</p> <p>Elevation 0"</p> <p>ADVANCED</p> <p>Trim planes (0)</p>	<p><b>Properties</b></p> <p>Same as it ever was, properties control location (justification, elevation) and overall dimensions</p> <p>Length is really height for a columns</p> <p>Offsets let you "trim" back the structural member (beam) from another column that you might use as pick points to create the beam.</p>
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<p><b>Structural Member Style Properties - Steel Z Girt 10</b></p> <p>General Design Rules Materials Classifications Display Prop</p> <table border="1"><thead><tr><th>Component</th><th>Name</th><th>Relative...</th><th>No...</th><th>Sc...</th><th>Mirro</th></tr></thead><tbody><tr><td>Girt</td><td>Steel Z Girt 10</td><td>Start</td><td>0</td><td>1</td><td>No</td></tr></tbody></table> <p>Hide Details Add</p>	Component	Name	Relative...	No...	Sc...	Mirro	Girt	Steel Z Girt 10	Start	0	1	No	<p><b>Style</b></p> <p>All styles you get from the structural catalog will be a shape extruded through the length of the member.</p> <p>More complex shapes can be had from the Content Browser Design Tools catalog, or the Content\Styles drawing ie bar joist, columns with wraps etc.</p>
Component	Name	Relative...	No...	Sc...	Mirro								
Girt	Steel Z Girt 10	Start	0	1	No								



### Display

Structural members have the most display reps of any object – if the section does not show enough detail – change the Section\_Elevation display set to use the Elevation Fine detail (is set this way by default).

Watch out for Columns and Beams and Braces – they too do not have a nice plan display rep – be careful with osnaps around them

### Display Rep Plan

If you want a single line – turn off the components – or use the logical representation instead

### Adding

#### Tool, RightClick > Apply to: Beam or Linework

Use the “apply to” to convert lines to beams

#### Pick points

If you add beams in Iso mode, you can set your osnaps to NODE only and snap along the tops of the columns in the drawing

#### Other

### Modifying

#### ACAD modifying

Trim, extend work.

#### RightClick Tools

Edit Trim Planes (do in ISO view) allows you to edit the trim planes in a graphic way rather than through the dialog box

#### Etcetera

Make sure to look in the styles folder for more Member styles – there are two drawings installed that have complex member styles. One for Bar joist, and the other for column wraps and such.

Watch out for Columns and Beams and Braces – they too do not have a nice plan display rep

Separate columns from a column grid by releasing the anchors (right click). To place in separate drawings.

# Sections and Elevations

## Section and Elevation one sheet

See also Callouts section

## Basics

There are 3 main ideas behind sections and elevations – or rather 3 completely different ways to generate a section of the building model. A 3D Section/ Elevation, A 2D Section/Elevation, or a Live Section. In all cases the section is inherently linked to the section line that generated it. This chapter is primarily concerned with the

- Do not associate hatch
- Hatches merged become lines (drastic performance hit)
- Control visibility by style – everything is in the display properties

While some architects have a style that lends itself to using the

## Properties

### Style

The 2D Section elevation style contains two main tabs the Components tab and the Design Rules tab. The components tab allows you to create components of the style that you can assign display properties to. The Design Rules tab works in conjunction with the

### Display

### Adding

Tool, RightClick > Apply to:

### Pick points

### Other

### Modifying

### ACAD modifying

### RightClick Tools

### Etcetera

### Mysterious

Merge again after refresh to save previous changes (refresh 2D section will kick out all “Linework> edit operations into a separate 2D section right on top of the original – merge the two sections)

From the newsgroup

Hi Cameron,

Here's something to try... it seemed to help me.

Whenever CreateHLR or 2d section/elevations are calculated we do some postprocessing to remove overlapping segments. When there is lots of complex linework, however, this process can produce errors. You can turn this off by editing the following registry setting:

```
HKEY_CURRENT_USER\Software\Autodesk\AutoCAD\R16.0\ACAD-
XXX:XXX\AEC\4.0\AecGuiBase40\Preferences\HLRBypassLineCleanup
```

## Building Objects

Change this setting from 0 to 1 and try running CREATEHLR again. Does that help?

Chad

Hi Cameron,

Well, I'm glad you looked at that because I thought we weren't using that setting anymore. We did a bunch of work to reduce tolerance problems when generating 2d sections & elevations. 2d sections and elevations do not use HLRPRECISION at all. It appears that CreateHLR is still using HLRPRECISION as a factor when it shouldn't be so setting that to 1 is probably a good idea for everyone to do. It's been this way since ADT3 and I don't recall many other issues with CreateHLR so that's why we didn't realize it was a problem. Let us know if you notice any regressions, we'll investigate it further and probably remove the variable for the next release of ADT.

Thanks!

Chad

"timberdesign" <[admin@timber-design.com](mailto:admin@timber-design.com)> wrote in message  
[news:f18ccf9.1@WebX.maYladrTaRb...](mailto:news:f18ccf9.1@WebX.maYladrTaRb...)

Hi Chad, Thanks for getting back to me.... I have made the suggested registry change and can notice little change in the output. However, I decided to fiddle ;-) with one or two of the other settings. I had high hopes for HLRPRECISION and cranked it up and up and up from 5000 to 40000 but with little gain. Finally, I set it to 1 'et voila' spot on, as far as I can tell from limited testing. What have I done ????? can I leave it like this without ill effect? and should accuracy improve with lower settings? Look forward to hearing, hoping it is solved :-) Many thanks, Cameron.