

Visual

Professional Edition Tutorial A – Interior Application

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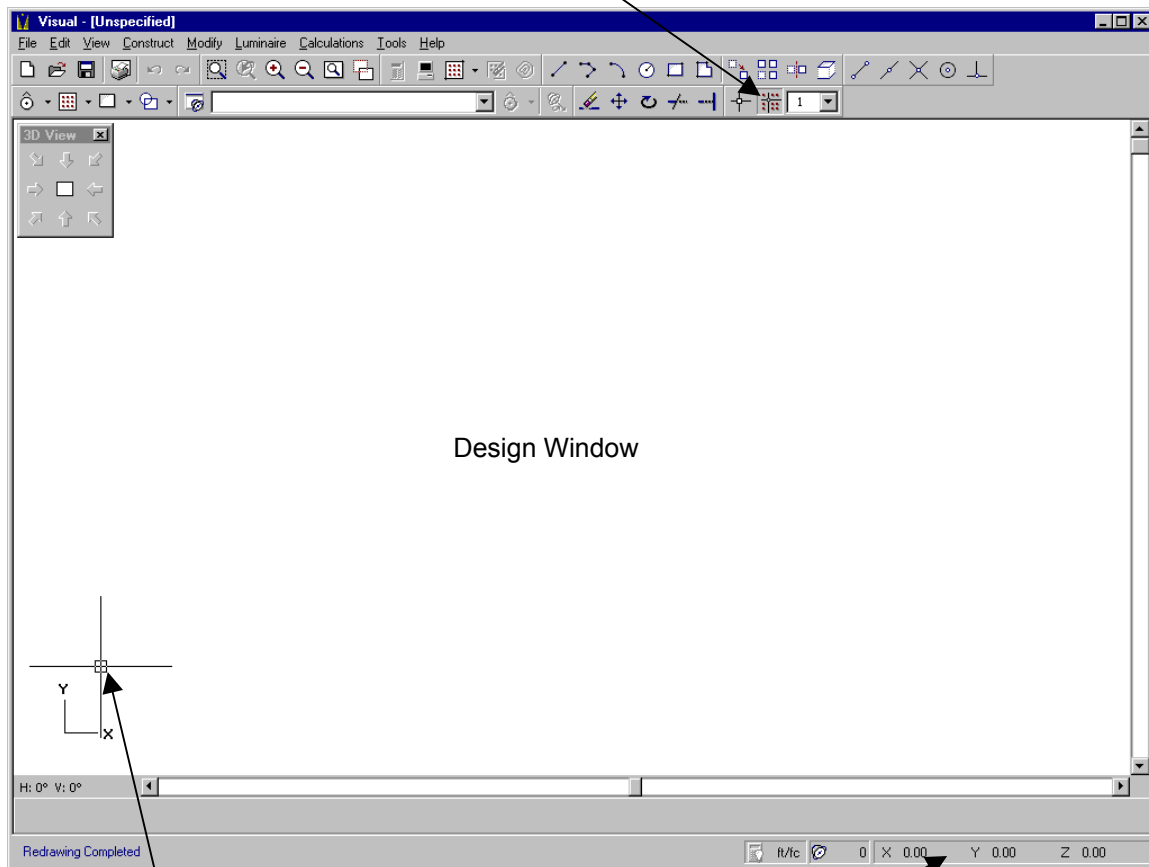
Introduction

In this tutorial, you will use Visual to develop and analyze a complete interior lighting model. Activities include starting a new project, constructing an irregular space using the ROOM command, building a Luminaire Schedule, placing Luminaires, placing a polygonal Calculation Zone, and analyzing the model. This tutorial assumes that you have read the first two chapters of the Visual Professional Edition User's Guide.

Starting a New Project

The first step is to launch the Visual Professional Edition from the Visual Program Group under the Windows™ Start menu. When the Visual Open Screen appears, select NEW INTERIOR FILE. The **Design Environment** will appear with a blank screen and await your first command. The incremental snap should be "on" and set to a value of 1. As you move your mouse in the Design Window, its location in absolute coordinates is reported in the lower right-hand corner of the design screen. The origin of the coordinate system (0,0,0) should be near the lower left-hand corner of the **Design Environment**.

Incremental Snap "On" and set to "1"



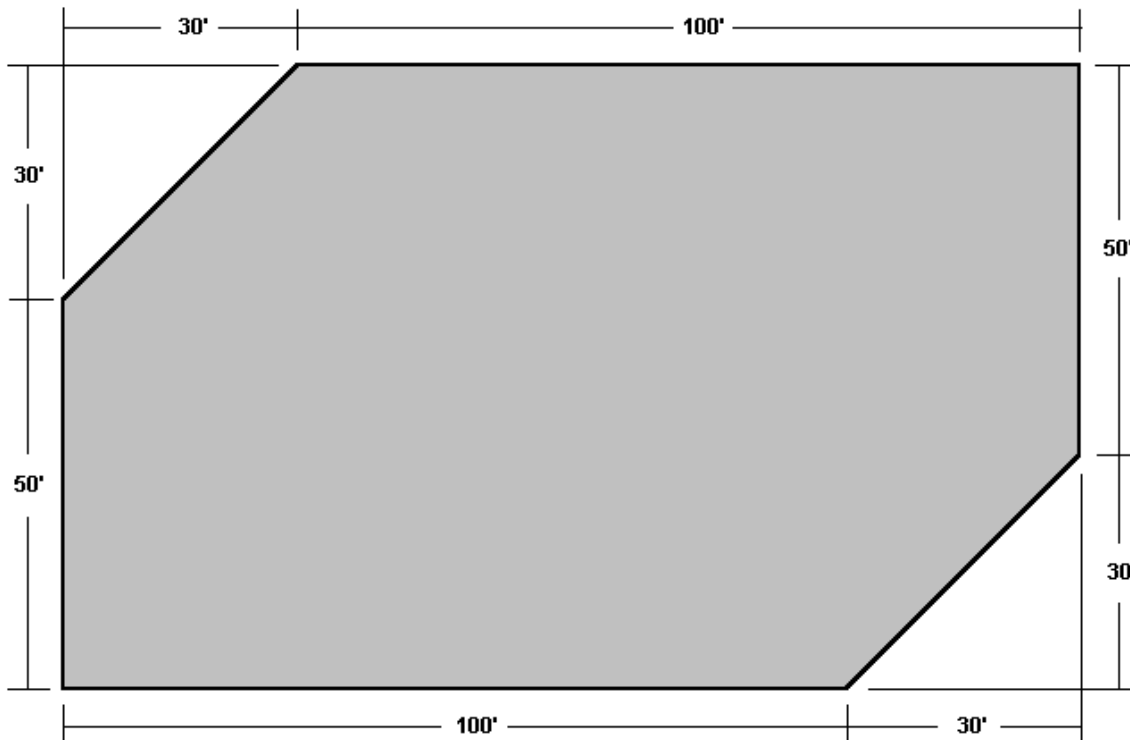
Coordinate Origin (0,0,0)

Absolute Coordinates

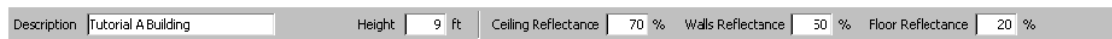
Constructing the Room

The first objective is to create a room having the floor plan depicted in the graphic below. The room will have a 9' ceiling height and the surface reflectances (ceiling, wall, and floor) will be 70/50/20 respectively.

Objective



- From the CONSTRUCT MENU, select ROOM and then POLYGON. This instructs Visual that you wish to construct a room with a non-rectangular footprint. The Status Bar will prompt for entry or selection of the first vertex in a series that will define the perimeter of the floor. The Property Bar will prompt for a description, and assignment of the room height and surface reflectances as shown below.



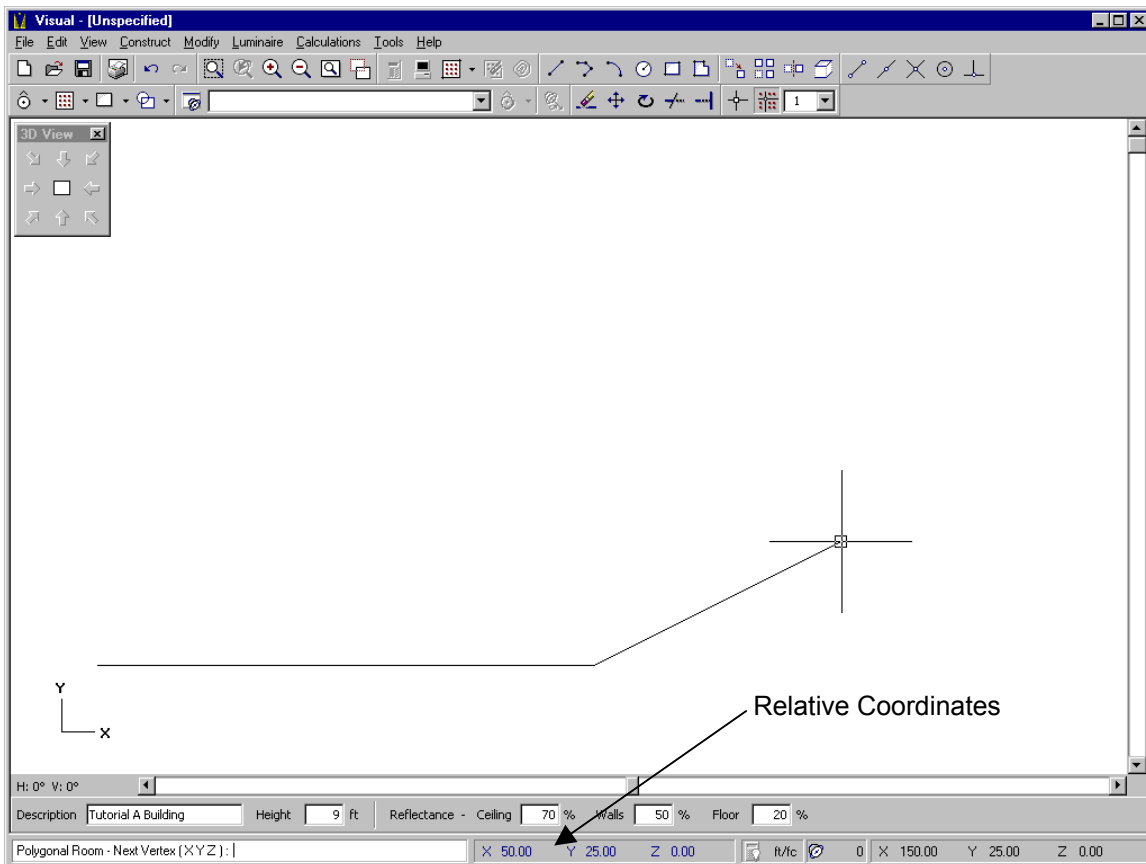
- Enter the description by placing the mouse cursor in the text box and typing. The default Height and Ceiling Reflectance values must be altered to reflect the desired combination. The Walls and Floor values should already be correct. If not, edit these values as well. Edit the appropriate values and click on the **Design Environment** to indicate that you are finished editing and are now ready to enter coordinate information. The mouse pointer will change to a crosshairs.

As a matter of good practice, the first coordinate will be chosen at the location of the origin (0,0,0). This makes the absolute coordinate information more meaningful which tends to speed the entire design process. Sometimes it's easier to enter coordinate information via the keyboard when the exact locations are known.

- Enter **0 0 0** (zero <space> zero <space> zero) followed by the ENTER key to select the coordinate origin. A line will then be drawn from the previously selected vertex to the mouse crosshairs, indicating the polygon boundary being entered.

From the origin, it is also a good practice to construct in the direction of the positive axes. This keeps all coordinate values positive which can greatly simplify their interpretation. Thus, the origin should represent the lower left-most vertex of the room if possible. Once again, looking back at the objective floor plan on the second page, it would appear that the next vertex should be to the right a distance of 100'. The vertices could be selected moving in either direction around the perimeter but they must be entered sequentially. As the mouse crosshairs are moved to the right, the relative coordinates (in blue) indicate the distance from the previous point, and the direction.

- Move the mouse crosshairs to the relative location (100,0,0) and left click to select this point. The screen should now appear as shown. Again, a line will be drawn from the previously selected vertex to the mouse crosshairs indicating the polygon boundary being entered next.



The third vertex involves a displacement in both X and Y relative to the previously selected point. According to the objective floor plan on the second page, the required distance is 30' to the right (X) and 30' up (Y).

- Move the mouse crosshairs until the relative coordinates (in blue) read (30,30,0), and left click to select that point for the third vertex.
- Alternatively, you can type the desired relative coordinates into the command line by prefacing the coordinate values with the @ sign. In this case, you would type **@30 30 0**.

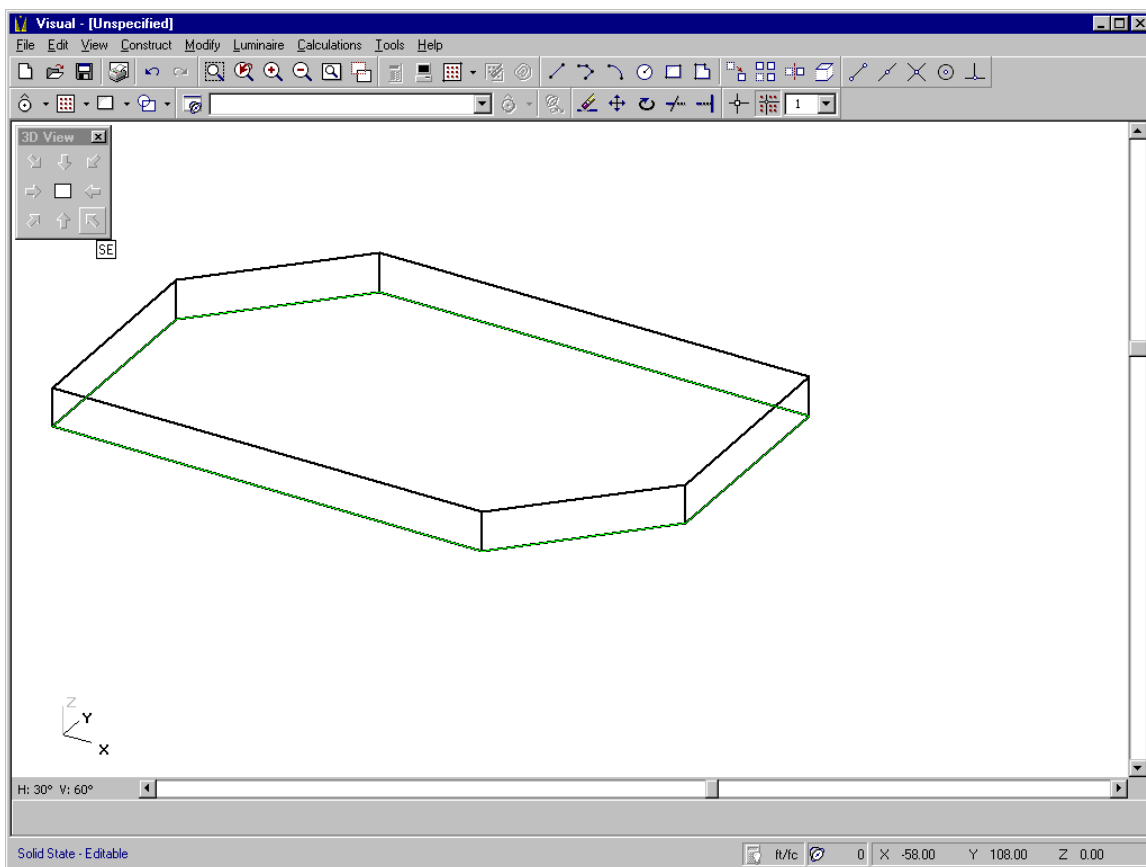
This process of selecting relative coordinates continues until all six vertices have been established. A negative sign in the relative coordinates simply indicates movement in the direction of the negative side of the given axis (X,Y,Z). There is no need to select the first coordinate (our original point of origin) in the sequence a second time.

- Right Click the mouse to indicate that all of the vertices have been selected and complete the command. The final side of the polygon will automatically be drawn from the last vertex to the first in order to close the polygonal floor plan and create the resulting room.

The screen should appear similar to the floor plan graphic presented in our objectives stated above. If it does not, select UNDO from the EDIT MENU and repeat the steps outlined above. At this point, it would be useful to visually verify that a room has indeed been created.

- If the floating 3D View Toolbar is not visible on your screen, select TOOLBARS...3D VIEW from the VIEW MENU.
- Click on the button in the lower right-hand corner of the array to select a South-East 3D view of the model.

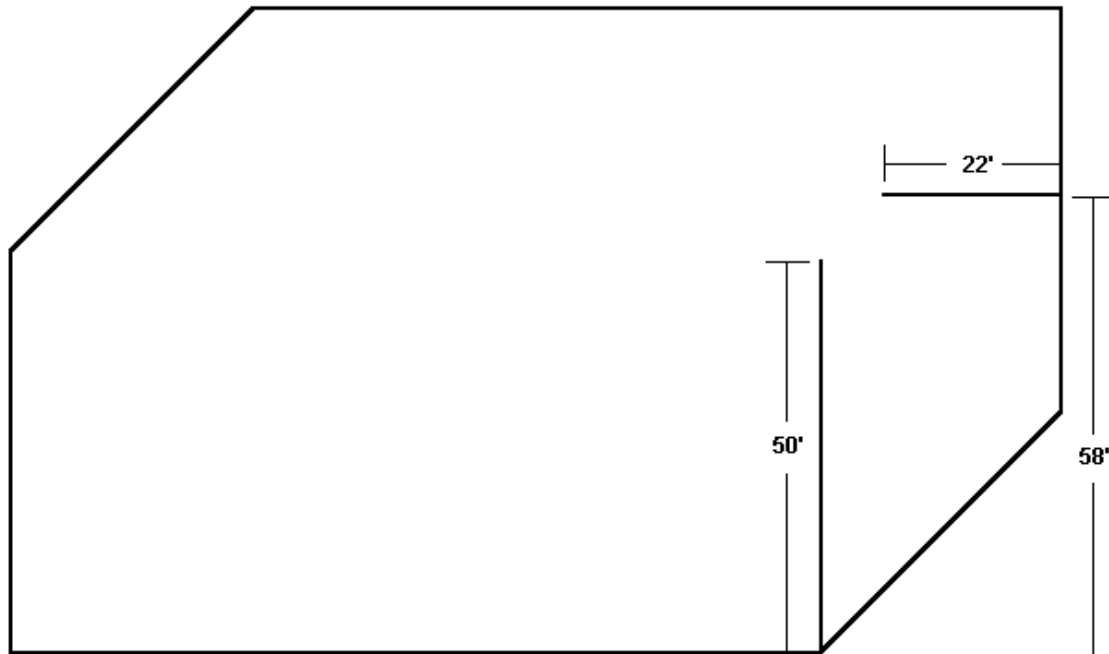
The screen should appear as indicated in the graphic below.



Note the orientation and appearance of the Coordinate Axes Icon. It is indicating that the mouse crosshairs are moving in the X-Y plane and that the positive X,Y, and Z directions are as shown. The Z (height) dimension is presently fixed at a value of 0.0 (at grade, or ground level) as indicated by the absolute coordinates. The green highlight along the floor of the room indicates that it is coincident with the plane that the mouse crosshairs are currently moving in. The other buttons on the 3D View Toolbar may be pushed to yield various 3D and elevation views. You are encouraged to experiment with the standard views and observe the different appearance of the

Coordinate Axes Icon in each case. Holding the mouse pointer over any button on the 3D View Toolbar will initiate a bubble-help description of the resulting view.

Next, you will enter two fixed interior walls that separate the receptionist area from the general office space. They extend from floor to ceiling and have a reflectance of 40%. The dimension and location of these surfaces is indicated in the plan view graphic below.



There is rarely only one "correct" path for constructing the lighting model. The various construct and modify commands may be used in many different combinations to ultimately arrive at the same result. In this tutorial, you will first create lines of the appropriate length and location to represent the position of the walls on the floor plane. These lines will then be extruded (stretched vertically) to the appropriate height, then converted to Solid Objects to accurately account for the effect of the walls in obstructing and reflecting light.

- Return to plan view by pressing the button in the center of the 3D View Toolbar array.
- Press the HOME key on the keyboard to guarantee that the working plane of the crosshairs is set to X-Y at Z=0 (grade level). This is always recommended after having changed the view or the working plane due to the way that Visual navigates in 3D (see the User's Guide).
- Select the LINE command from the CONSTRUCT MENU. The Status Bar will prompt for coordinate entry.
- Move the mouse crosshairs to the location (100,0,0) as indicated by the absolute coordinates. Select this point for the lower endpoint of the vertical wall. As with the ROOM command, a line will be drawn from the selected point to the location of the mouse crosshairs as the mouse is moved within the **Design Environment**.
- Moving your attention to the relative coordinates (in blue), locate the point (0,50,0) to select the other endpoint of the wall. This represents a location that is 50 units from the previously selected point in the direction of the positive Y-axis.
- Visual assumes that continuous line construction is intended so you must now terminate the command with a Right Mouse Click.

Your model should contain a line representing the wall that is vertically oriented in the objective graphic on the second page. If it does not appear correct, select UNDO from the EDIT MENU and repeat the above steps. Remember to reference the relative coordinates (in blue) rather than the absolute.

- The LINE command can now be easily re-issued by simply pressing the Right Mouse button.

Visual initiates the previous command whenever this button is pressed unless you are in the middle of a command. You must now locate the intersection of the second wall with the existing exterior wall on the right side of the objective graphic on the second page. This is an example of where judicious placement of the room within the **Design Environment** can be a benefit. Because the origin (0,0,0) is aligned with the lower left vertex of the room, the absolute Y coordinate corresponds with the objective dimension of 58'. When dimensions are provided in an inconvenient way, you can always draw lines as necessary to establish a given location and delete them later.

- Referencing the absolute coordinates, locate the point that lies on the existing exterior wall on the right side of the room with a Y coordinate of 58, this should correspond to the coordinate location (130,58,0).
- Referencing the relative coordinates, select the second endpoint of the line by choosing a point 22' to the left of the previous point. The relative coordinates (in blue) should read (-22,0,0).

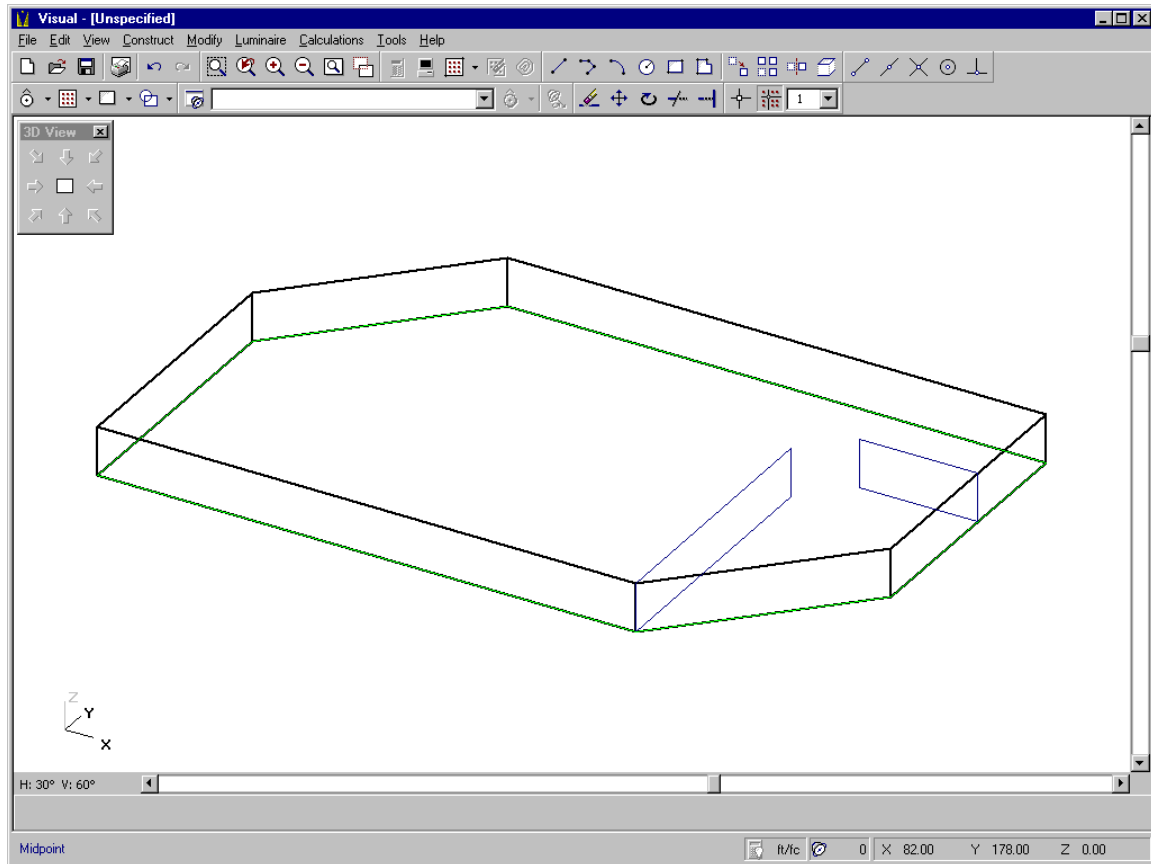
At this point, the plan view in Visual should appear the same as the objective graphic on the second page. If it does not, select UNDO from the EDIT MENU and repeat the above steps.

- Return to the South-East 3D view by selecting the appropriate button on the 3D Toolbar. The model should appear the same as before with the addition of the two lines that were just added to the floor plane.

One of the most powerful features of Visual is the ability to work in any view. To demonstrate the value of this feature, you will now extrude the two new lines to create vertical planes from them while remaining in a 3D view.

- Select the EXTRUDE command from the CONSTRUCT MENU. The Status Bar will prompt for object selection and the Property Bar will allow editing of the default extrusion distance. This is the distance the object will be "stretched".
- Edit the extrusion distance to reflect the 9' ceiling height since the extruded surface is to go from floor to ceiling. Remember that the direction of the extrusion is perpendicular to the plane of the crosshairs. In this case, that would be the direction of the positive Z-axis or straight up. That being the desired direction, you must now select the objects to be extruded.
- Move the mouse selection box over each of the lines and select them sequentially. The lines will turn red to indicate that they have been selected.
- Complete the command by Right Clicking the mouse.

The lines will be extruded and the model should appear as shown below.



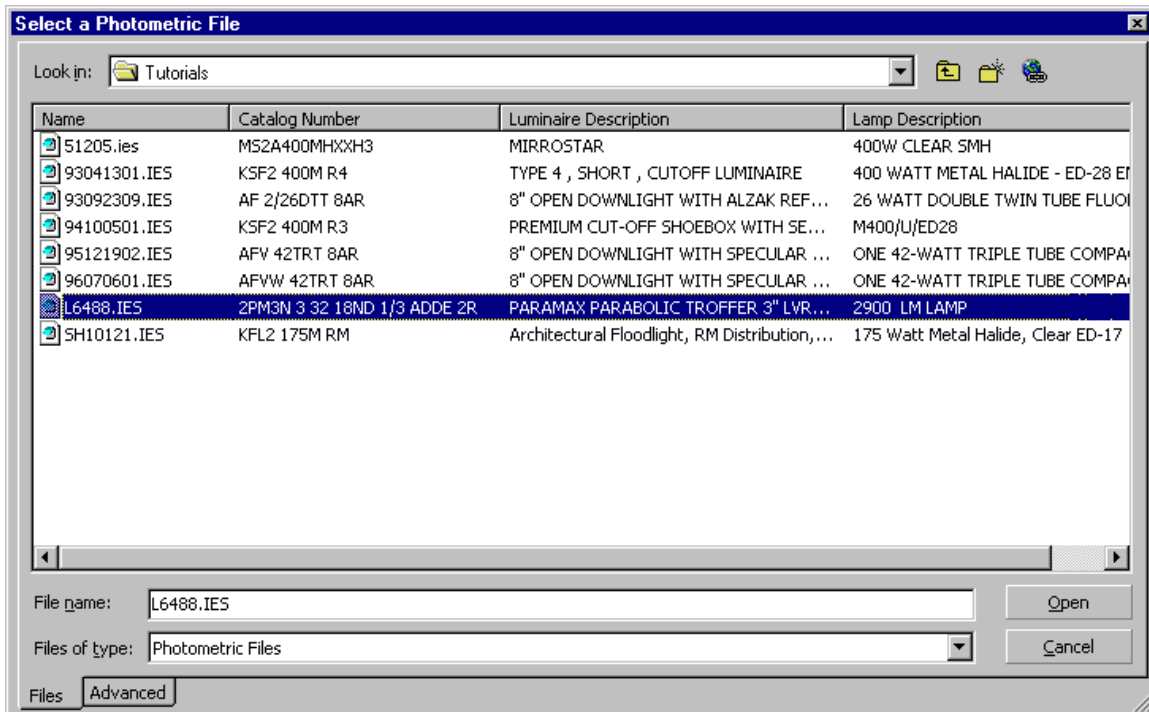
The extruded shapes are in the proper location but they're being drawn with thin, blue lines. This indicates that they are still only Background Objects, and must be converted to Solid Objects if they are intended to obstruct and reflect light.

- From the TOOLS MENU, select CONVERT TO and then SOLID. The Status Bar will prompt for object selection and the Property Bar will allow the assignment of a description and reflectance value.
- Edit the reflectance field to represent the desired **40%** value and enter a description if desired.
- Select the two background objects and terminate the command with a Right Mouse Click. The walls should be re-drawn as Solid Objects with thick, black lines.

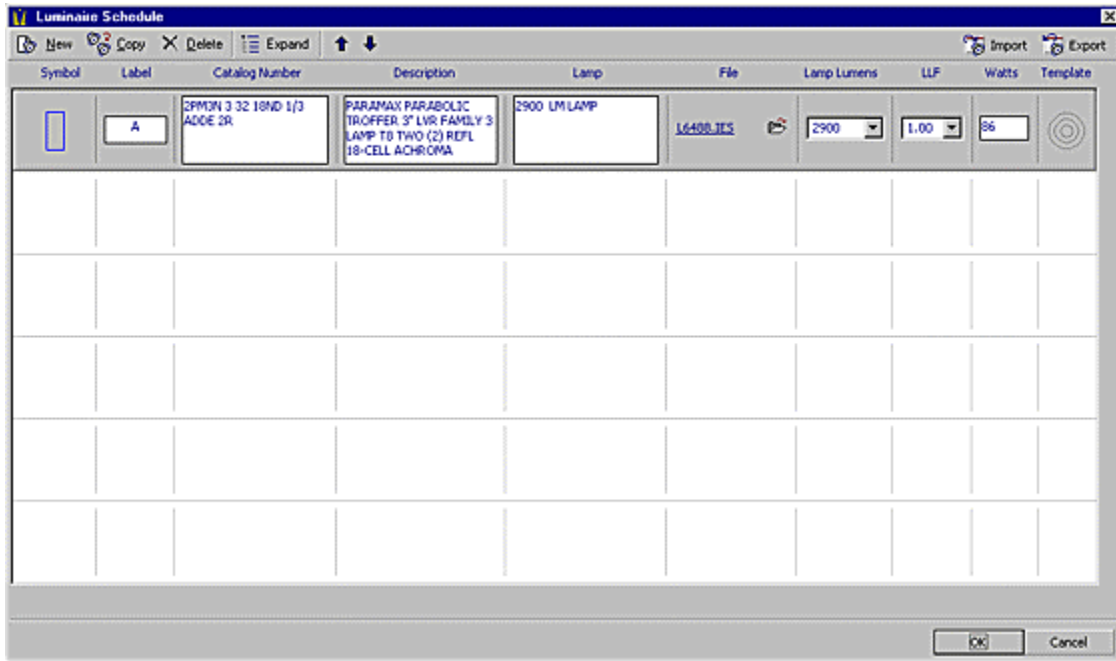
Building the Luminaire Schedule

Next, you will create a Luminaire Schedule.

- Select SCHEDULE from the LUMINAIRE MENU. The **Luminaire Schedule Editor** will appear.
- Select NEW from the TOOLBAR. A dialog box will appear for the selection of a photometric file.
- Navigate to the Visual 2.0 directory on your hard drive under the Program Files folder (or to wherever Visual was installed on your computer). There, you will find the Tutorials folder. Open this folder.
- A list of photometric files will be displayed, including catalog numbers, luminaire descriptions, and lamp descriptions.
- We want a parabolic troffer, so select the catalog number 2PM3N 3 32 18ND 1/3 ADDE 2R and then press the OPEN button to load the information and return to the **Luminaire Schedule Editor**.



The schedule should appear as shown below.



The various elements of the schedule entry can now be modified as desired.

- Change the Light Loss Factor (LLF) to a value of **.75** for aluminum parabolic troffers.

NOTE: The default values in the drop-down list box can be customized through the **Options Form** under the TOOLS MENU.

You'll also be using a downlight and a downlight wall-washer in the reception area, so these must be added to the Luminaire Schedule as well.

- Select NEW from the TOOLBAR and repeat the file selection process to add the following Luminaires to the schedule:

AFV 42TRT 8AR under ...\\Program Files\\Visual 2.0\\Tutorials
 AFVW 42TRT 8AR under ...\\Program Files\\Visual 2.0\\Tutorials

- Assign a Light Loss Factor of .81 to each of these Luminaires.

Next you will modify the symbol for the wall-wash downlight to better distinguish it and help indicate its orientation in installation.

- Left Click on the Symbol graphic at the left side of the Luminaire "C" schedule entry. This will launch the **Symbol Editor**.

On the right side of the **Symbol Editor** are options for selecting the Symbol Modifier.

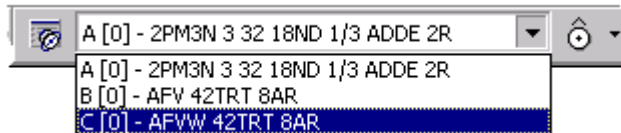
- Select the MODIFIER category and choose the WALL option. The symbol will become partially shaded to indicate the direction of the wall-wash (toward the non-shaded side). Colors and other options may be chosen in a similar fashion as desired.
- Select OK to complete symbol editing and return to the **Luminaire Schedule Editor**.
- Select OK to return to the **Design Environment**.

The **Luminaire Schedule Editor** should now appear as shown below. If it does not, delete any incorrect entries by selecting the appropriate row and clicking the DELETE button on the toolbar. Then, re-add the appropriate luminaire following the procedure above.

Symbol	Label	Catalog Number	Description	Lamp	File	Lamp Lumens	LLF	Watts	Template
	A	2PM3N 3 32 18ND 1/3 ADDE 2R	PARAMAX PARABOLIC TROFFER 3' LVR FAMILY 3 LAMP 18 TWO (2) REFL 18-CELL ACHROMA ...	2900 LMLAMP	U6408.IES	2900	0.75	06	
	B	AFV 42TRT 8AR	8" OPEN DOWNLIGHT WITH SPECULAR ALZAK REFLECTOR .	ONE 42-WATT TRIPLE TUBE COMPACT FLUORESCENT, VERTICAL BASE-UP POS.	95121802.IES	3200	0.81	43.7	
	C	AFVW 42TRT 8AR	8" OPEN DOWNLIGHT WITH SPECULAR ALZAK REFLECTOR AND WALLWASH KICKER.	ONE 42-WATT TRIPLE TUBE COMPACT FLUORESCENT, VERTICAL BASE-UP POSITION.	96070601.IES	3200	0.81	45.1	

Placing Luminaires

Upon returning to the **Design Environment**, you will note that the LUMINAIRE TOOLBAR is populated with the Luminaire Types from the Luminaire Schedule. The drop-down list box is used to select a Luminaire for placement.



- Return to plan view by pressing the center button on the 3D View Toolbar.
- Press the HOME key on the keyboard to ensure that the working plane is set to X-Y, at Z=0.
- Press the down arrow at the right side of the Luminaire list box and select Luminaire type A (2PM3N 3 32 18ND 1/3 ADDE 2R) from the list for placement.
- Select PLACE from the LUMINAIRE MENU. The Status Bar will prompt for coordinate selection, the Property Bar will display edit boxes for Mounting Height, Orientation, and Tilt field editing, and an implied Luminaire symbol graphic will be attached to the mouse crosshairs.

The Mounting Height field corresponds to the height at which Luminaires will be placed above the current working plane. Since the working plane is set at grade (Z=0) and the ceiling height is 9', the appropriate mounting height would be 9' in order for recessed Luminaires to be placed flush with the ceiling.

- Move the mouse pointer over the Property Bar and edit the Mounting Height field appropriately.

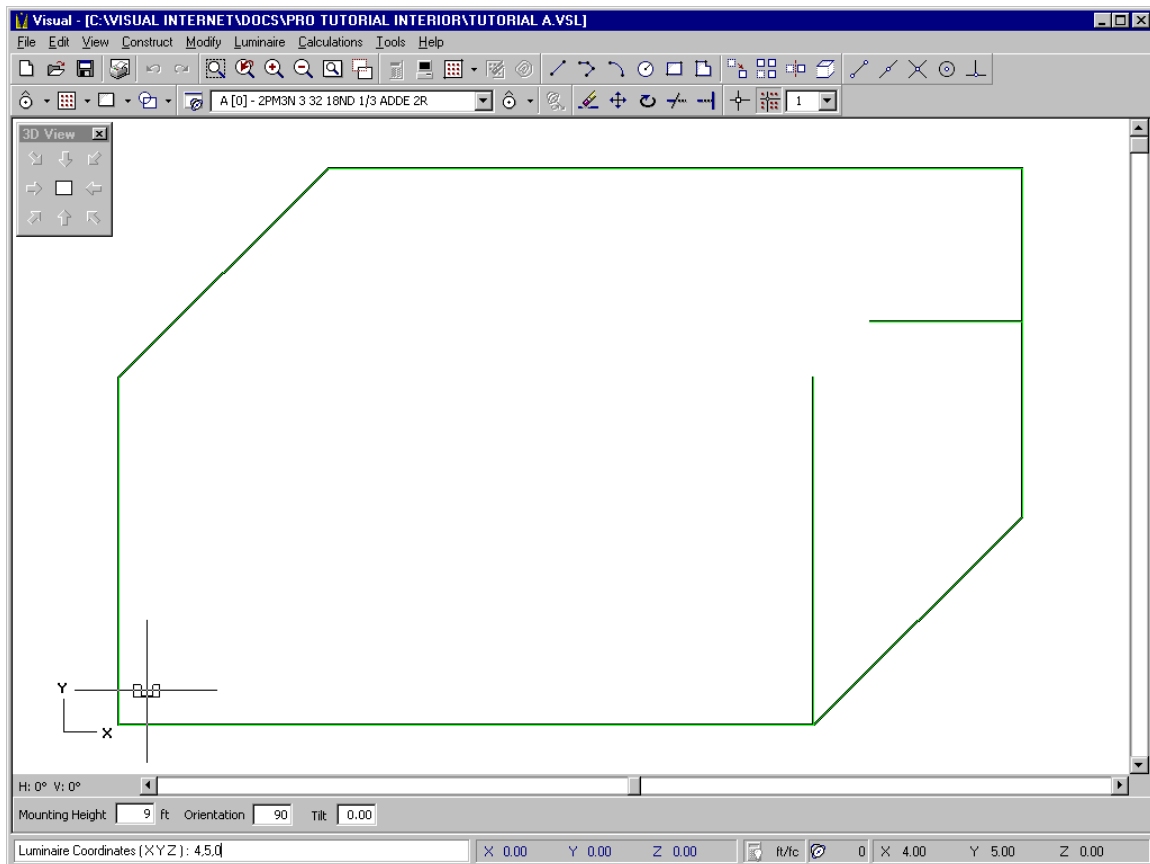
For aesthetic reasons, it's often best to orient Luminaires in a manner that compliments the room geometry.

- Enter a value of **90** in the Orientation field and you will see the change reflected in the Luminaire Symbol graphic at the mouse crosshairs. The Luminaire should now be oriented so that its lengthwise dimension coincides with that of the room.

The Luminaires will be spaced 10' on center in the breadth and 8' on center in the lengthwise dimension. A good rule of thumb is to position the first row or column of an array half the desired spacing distance away from the wall. This being the case, a good starting place for the first Luminaire location would be (4,5,0).

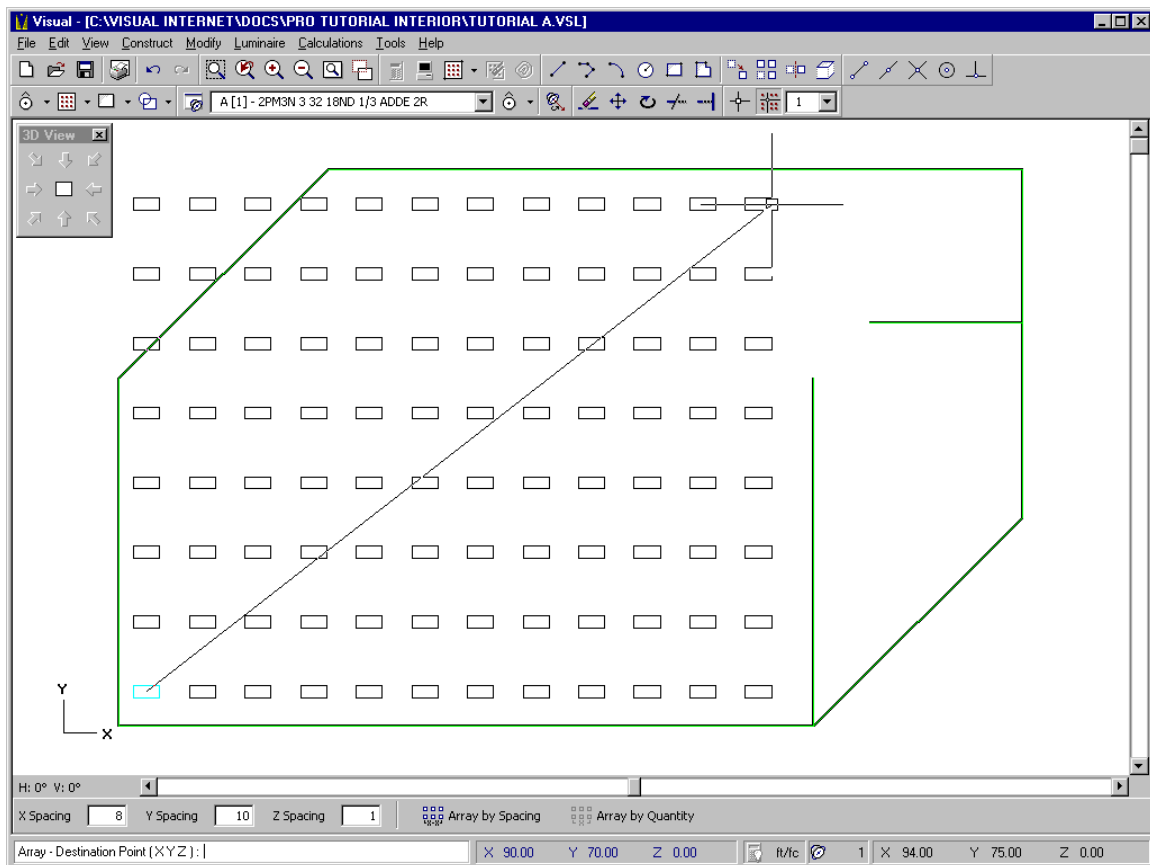
- Move the mouse crosshairs to that location using the absolute coordinates. Left Click to place the first Luminaire in the model.
- Right Click the mouse to indicate that you are finished placing Luminaires and complete the command.

Here again, judicious model placement pays benefits because the coordinate origin is aligned with the lower-left vertex of the model, which is conveniently the point of reference. You should have a single 2'X4' Luminaire oriented E-W and located near the lower-left corner of the room. If not, select UNDO from EDIT MENU and repeat the above steps.



The next step is to create a rectangular array of Luminaires to fill the office space.

- From the CONSTRUCT MENU, select ARRAY and then RECTANGULAR. The Status Bar will prompt for object selection and the Property Bar will present edit fields for X, Y, and Z spacings. Make sure that the ARRAY BY SPACING option on the Property Bar is selected. Type **8** for the X-spacing and **10** for the Y-spacing. The Z-spacing value should be left at **1**.
- Select the single Luminaire by Left-Clicking on its center. The luminaire will turn red when it is selected. Terminate the selection mode with a Right Click of the mouse. The Status Bar will then prompt for a base point.
- Select the center of the existing Luminaire (4,5,0). The implied Luminaire array will be drawn as the mouse crosshairs are moved within the design space. The relative coordinates (in blue) display the current displacement of the mouse crosshairs relative to the previously selected point as always.
- Move the mouse crosshairs until the array fills the majority of the room, as shown below.
- Left Click the mouse at this point to complete the ARRAY command.



The excess Luminaires in the upper-left corner must now be deleted and some additional Luminaires must be added to fill the space in the upper-right corner of the office area.

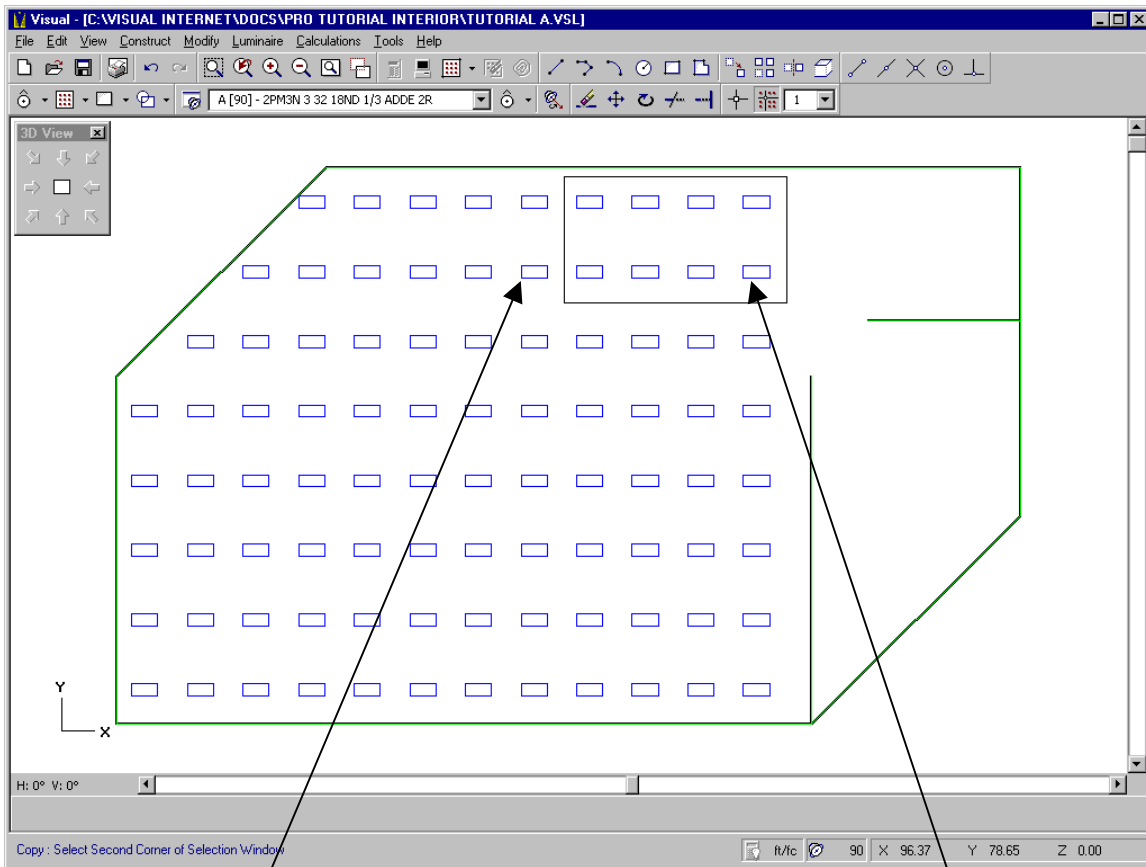
- Select ERASE from the MODIFY MENU. The Status Bar will prompt for object selection.
- Select the six Luminaires that are clearly outside the room boundaries. Remember that Luminaires are selected at the center of the symbol.
- If you inadvertently select the room in the process, press the **"R"** key on the keyboard to toggle the selection mode to remove. Then, Left Click on the room to remove it from the selection set. Press the **"A"** key on the keyboard to return to add mode.
- When the selection set consists of only the six subject Luminaires, Right Click the mouse to complete the ERASE command and remove those Luminaires from the lighting model.

If you did not achieve the desired result, select UNDO from the EDIT MENU and try again.

There are numerous ways to place the additional Luminaires needed in the upper-right portion of the model. In this case, you'll use the copy command to select the right size and configuration of Luminaires from among the existing ones and place a copy in the appropriate location.

- Select COPY from the CONSTRUCT MENU. The Status Bar will prompt for object selection.
- Looking at the model, it appears that a 4X2 array of Luminaires will suffice.
- Select the 4X2 array of Luminaires in the upper right corner to copy using the window selection technique.

Your screen should appear as shown below.



Adjacent Luminaire

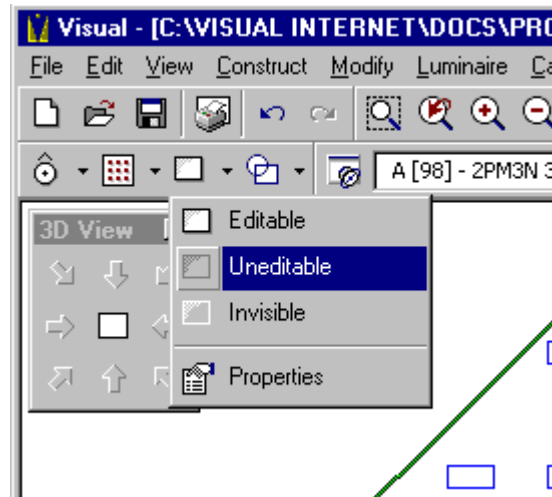
End Luminaire

- Right Click to terminate object selection. The Status Bar will prompt for a base point to be used in placing the copy.
- Select the center of the adjacent Luminaire identified in the graphic above as the base point (60,65,0). The reason for selecting this base point will become obvious in a moment. As the mouse crosshairs are moved, the implied contents of the copy selection set will be drawn.
- Selecting the center of the end Luminaire identified in the graphic above will now result in the correct copy while maintaining the appropriate spacing relationship.
- Right-Click to terminate the copy command.

Now, a reasonable Luminaire layout has been achieved in the office area, but the array could be better centered in the space. The Move command can be used to "shift" the Luminaire locations

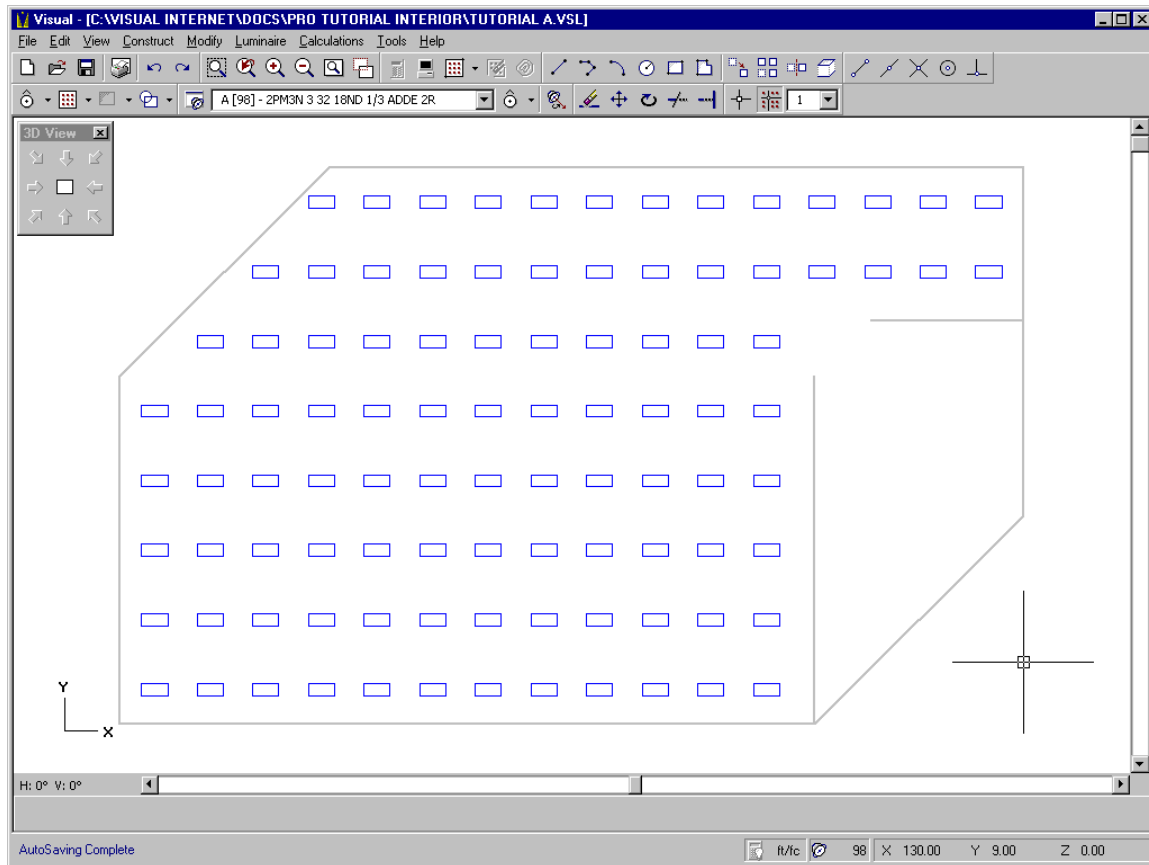
relative to the room. Since this will involve the selection of all Luminaires, it will be quickest to change the state of the Solid Objects in the model to uneditable and use the window technique to select only the Luminaires.

- Select UNEDITABLE from the SOLIDS PROPERTIES TOOL, as shown below.



- All Solid objects in the model will be made uneditable. They will be drawn in gray to indicate their state.
- Select MOVE from the MODIFY MENU. The Status Bar will prompt for object selection.
- Using the window technique, select all Luminaires in the model.
- Right Click the mouse to terminate the object selection process. The Status Bar will prompt for a base point.
- Select any point near the center of the screen and study the periphery of the room as the Luminaires are translated with the mouse. A relative displacement (relative coordinate reading) of (1,0,0) appears to represent the most centered arrangement overall.
- Select that point to terminate the MOVE command and reposition the Luminaires in the model. Since there will be no reason to alter the Solid Objects in the model, they will be left in the UNEDITABLE state indefinitely. This simplifies object selection during Luminaire and Calculation Zone placement.

The design should appear as shown below.



As always, you can use the UNDO command to go back and fix any mistakes.

We will now place a line of wall-washers along the reception area side of the longer interior wall. The process is similar to that of placing luminaires in the office area. The recommended spacing for the wall-wash Luminaire is equal to the setback, or perpendicular distance from the wall. A distance of 3' is common and will be used in the current design. Thus, you must now locate and orient the first Luminaire in the sequence. Since you'll be working exclusively within the reception area, it may be convenient to zoom in.

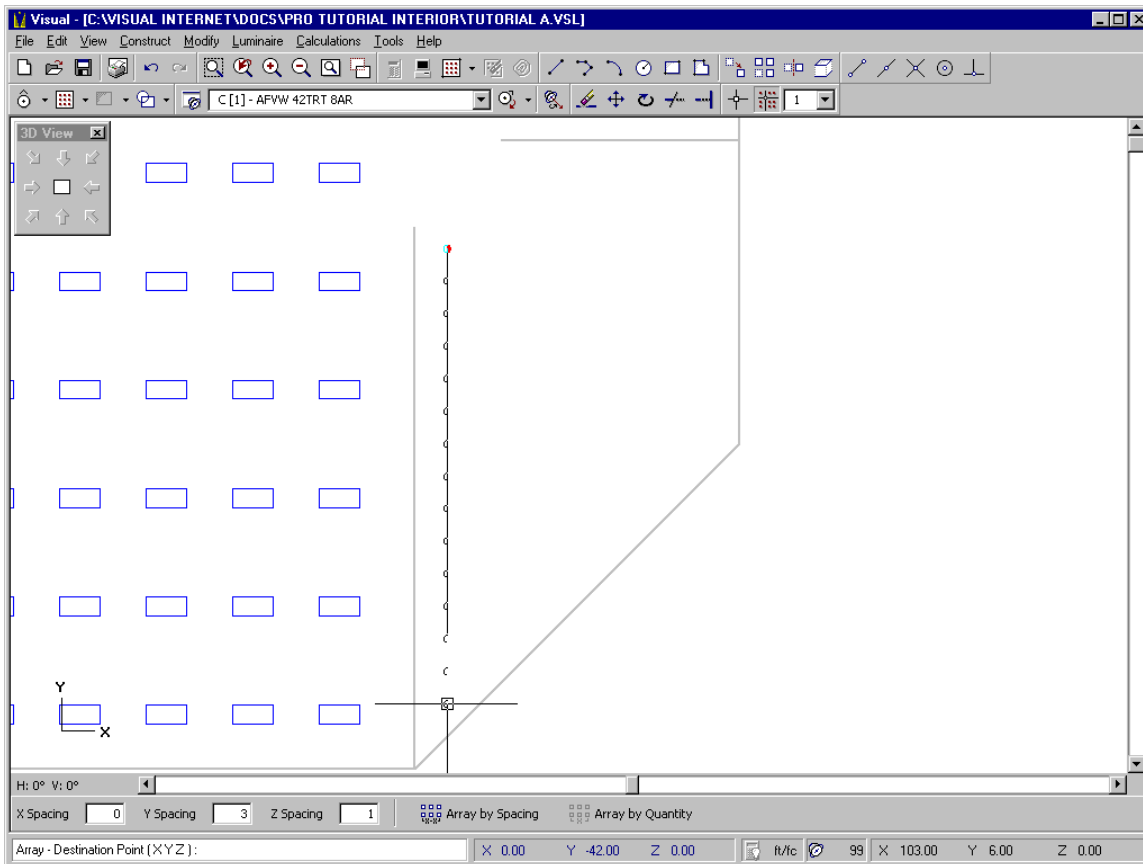
- From the VIEW MENU, select ZOOM and then WINDOW. The Status Bar will prompt for the selection of window corners.
- Draw a rectangle that just contains the entire receptionist area by picking its opposing corners. The Design Window will be enlarged to present the chosen region in greater detail.
- Choose Luminaire C (AFVW 42TRT 8AR) from the Luminaire list box on the Toolbar to prepare for placement.
- Select PLACE AND ORIENT from the LUMINAIRE MENU to initiate placement. The Status Bar will prompt for coordinate selection.
- The Property Bar allows the Mounting Height and Tilt fields to be edited. Edit the Mounting Height field, if necessary, to place the wall-washers flush with the ceiling at 9'. The field should contain the number **9**.
- Place the first wall-wash Luminaire 3' to the right of the interior wall and 2' from the end of the wall (absolute coordinate location 103,48,0).

Because the PLACE AND ORIENT command was chosen, the Status Bar will now prompt for selection of a second coordinate to establish the Luminaire orientation. Move the mouse crosshairs and you will see a line being drawn from the center of the Luminaire Symbol to the mouse crosshairs. The orientation of the Luminaire symbol follows the mouse crosshairs, indicating the direction of photometric zero (the direction of the wall-wash).

- Select the point on the wall that is directly to the left of the Luminaire. This will properly orient the Luminaire and complete the PLACE AND ORIENT command.

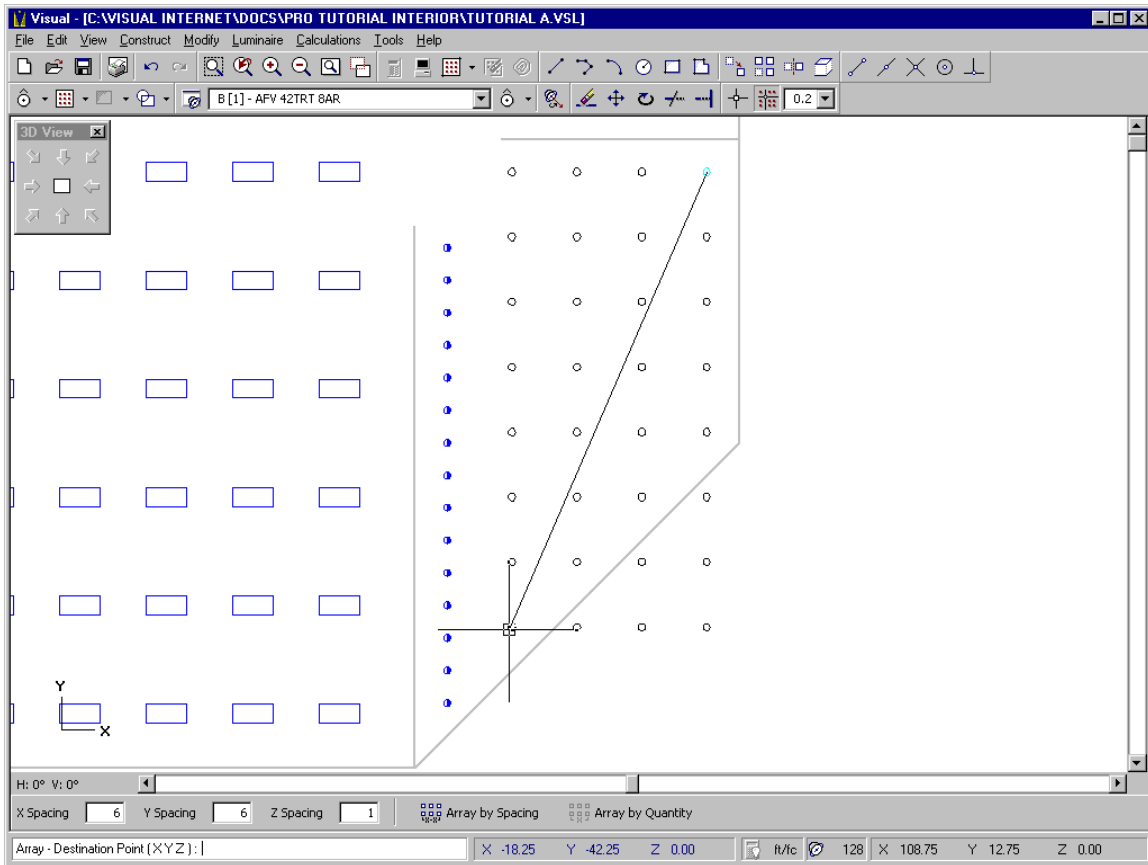
You should now have a single wall-wash Luminaire placed near the upper end of the interior wall and oriented to illuminate the wall. The Luminaire symbol should be shaded on the right side indicating that the wall-wash is directed to the left. The rest of the wall-wash luminaires can be placed using the ARRAY command.

- From the CONSTRUCT MENU, select ARRAY and then RECTANGULAR.
- Change the X-spacing to **0** so that no luminaires will be spaced in the X-direction.
- Change the Y-spacing to **3**.
- Select the wall-wash Luminaire by Left Clicking on its center, then Right Click to terminate the selection process. The Status Bar will prompt for selection of a base point; select the center of the wall-wash Luminaire.
- Move the mouse crosshairs down until the array extends the length of the wall, as shown below. Left Click to complete the array.



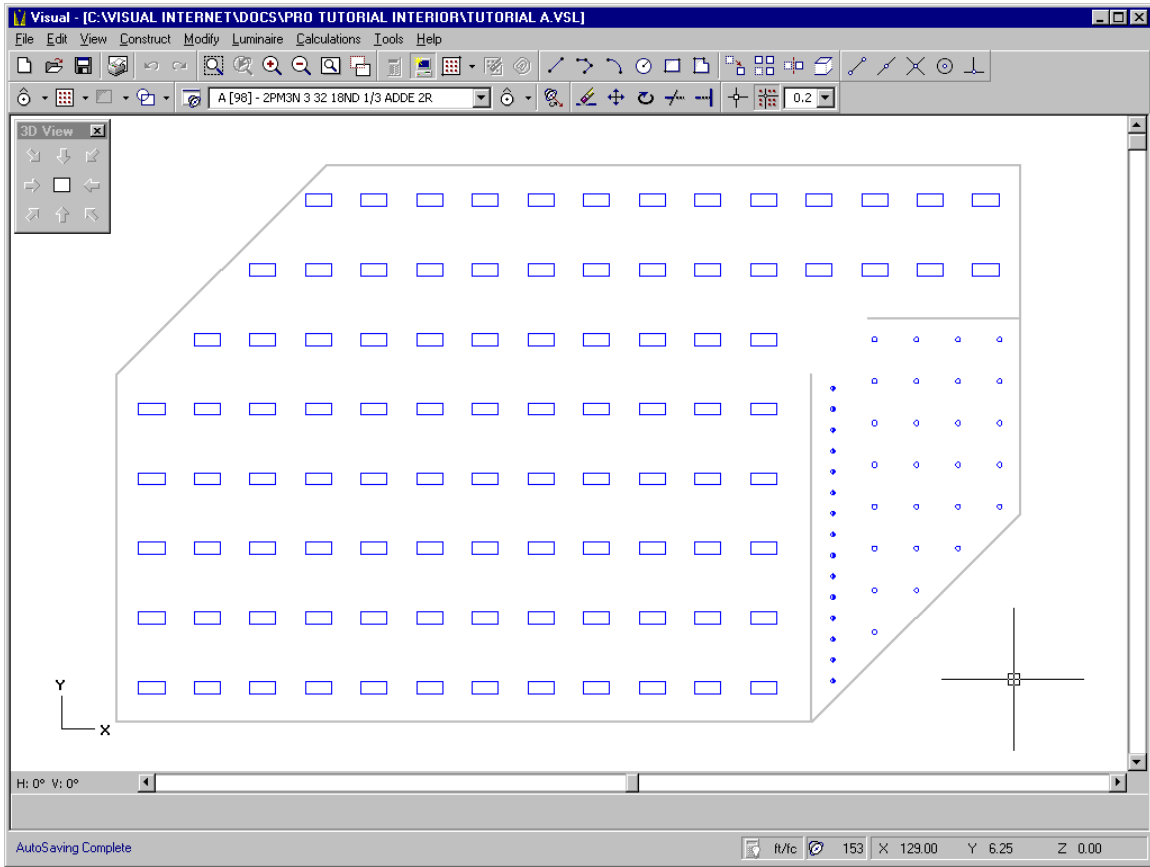
Now only the general downlighting for the reception area needs to be designed. The downlights will be located in a square array, 6' on center, throughout the remaining reception area.

- Select Luminaire B (AFV 42TRT 8AR) from the Luminaire list box on the Toolbar. Note that the two other Luminaire Types now have quantities reported within brackets.
- Select the PLACE command from the LUMINAIRE MENU. The Status Bar will prompt for coordinate selection and the Property Bar will once again allow the Mounting Height, Orientation, and Tilt fields to be edited.
- Make certain that the Mounting Height field is set to 9', and select the point 3' from either wall in the upper right corner of the reception area (127,55,0).
- From the CONSTRUCT MENU, select ARRAY and then RECTANGULAR.
- Set both the X- and Y-spacing to 6.
- Select the single downlight by Left Clicking on its center, then Right Click the mouse to terminate object selection.
- The Status Bar will prompt for a base point, select the center of the existing downlight. As the mouse crosshairs are moved downward and to the left, the implied Luminaire array will again be drawn.
- Left Click to complete the array when the Reception Area is filled.



- Select ERASE from the MODIFY MENU and delete the six excess Luminaires in the lower-right region of the model. Luminaire placement is now complete.
- From the View Menu, now select Zoom and then All to view the entire model.

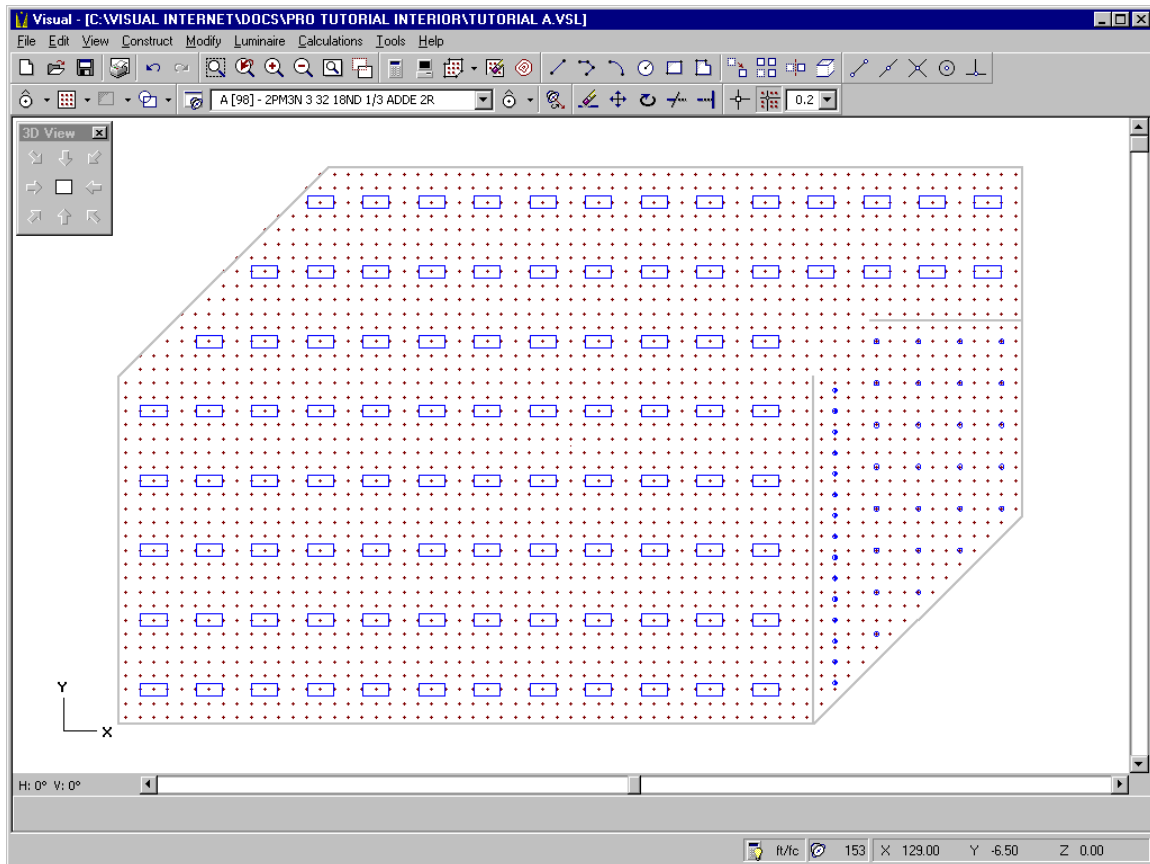
Your screen should appear as shown.



Placing a Calculation Zone

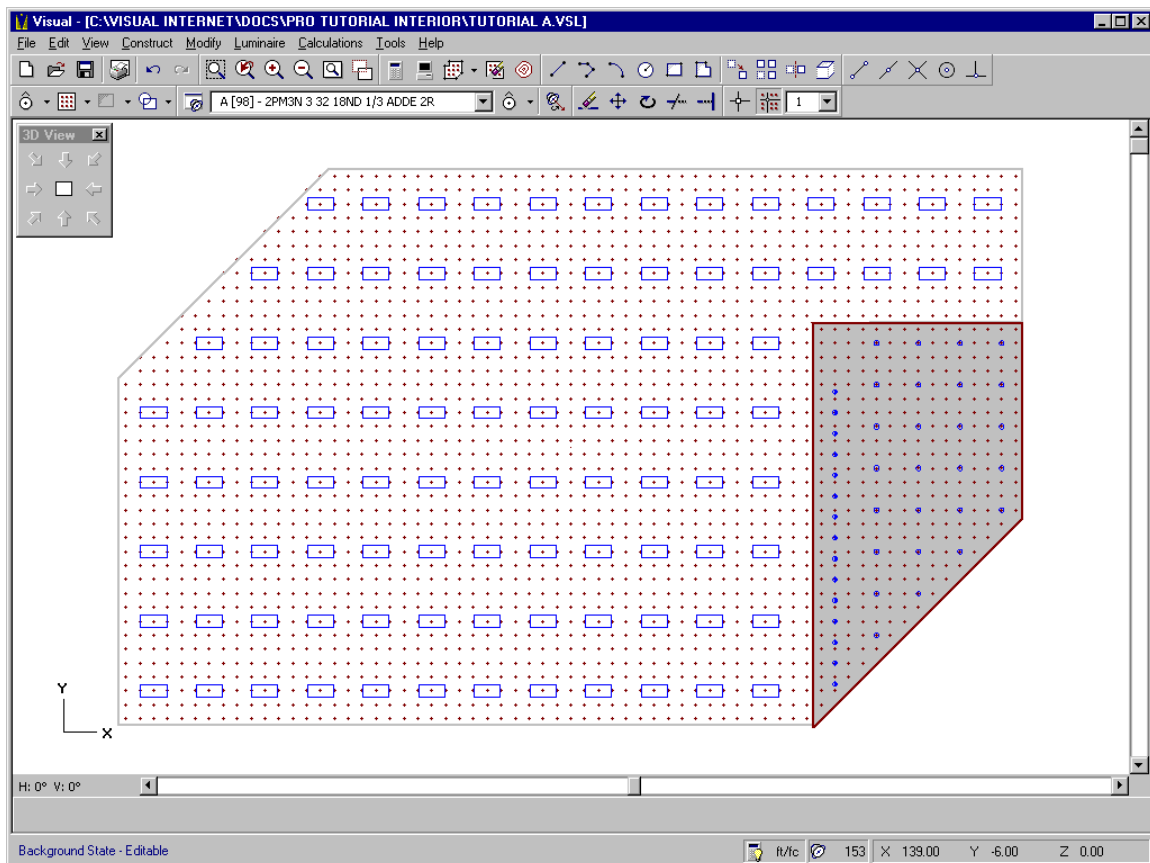
- From the CALCULATIONS MENU, select CALCULATION ZONE and then POLYGON. The Status Bar will prompt for coordinate selection and the Property Bar will present numerous options for editing.
- The default Row and Column point spacing should be set to 2'. If not, edit those fields for 2' spacing in each dimension. The Height field is analogous to the Mounting Height field in Luminaire placement. It represents the distance that the Calculation Zone will be placed above the current mouse plane.
- Enter a value of **2.5** in this field to place the calculation zone at desk height (30") throughout the space.
- Sequentially click on the vertices defining the periphery of the room in the same way that the room was initially created.
- Terminate the command with a Right Click of the mouse once the final vertex has been selected.

The room will be filled with red calculation points spaced 2' on center in either direction. Your screen should appear as shown.



Next, you will create two separate Statistical Zones to represent the office area and the reception area.

- From the CALCULATIONS MENU, select STATISTICAL ZONE. The Status Bar will prompt for object selection and the Property Bar will display a Description Entry field.
- Enter the description "**Reception Area**" in the text field and leave the default color and point style. Then select the calculation zone at any calculation point. The Status Bar will prompt for the coordinates of the polygonal boundary of the Statistical Zone. The Reception Area will be defined by drawing a polygon around the area shaded in the figure below.



- Sequentially select the polygonal boundary of the reception area.

NOTE: All points lying within the Statistical Zone boundary will be included in the statistical calculations pertaining to that zone. For this reason, it is important to select the boundary unambiguously with respect to the calculation points. In the example application, care must be taken to include calculation points lying exactly along the exterior walls of the room. Simply draw the boundary as though you were fencing calculation points without regard to the appearance.

- Terminate the command with a Right Click of the mouse once the final vertex has been selected.
- Right Click the mouse to indicate that you want to repeat the previous command.
- Enter the description "**Office Area**", select dark red for the color and select the cross for the point style. Then select the polygonal boundary of the remaining office area in the same manner. Again, exercise care to include the points along the diagonal exterior wall in the upper-left portion of the room.

Performing Calculations and Viewing Results

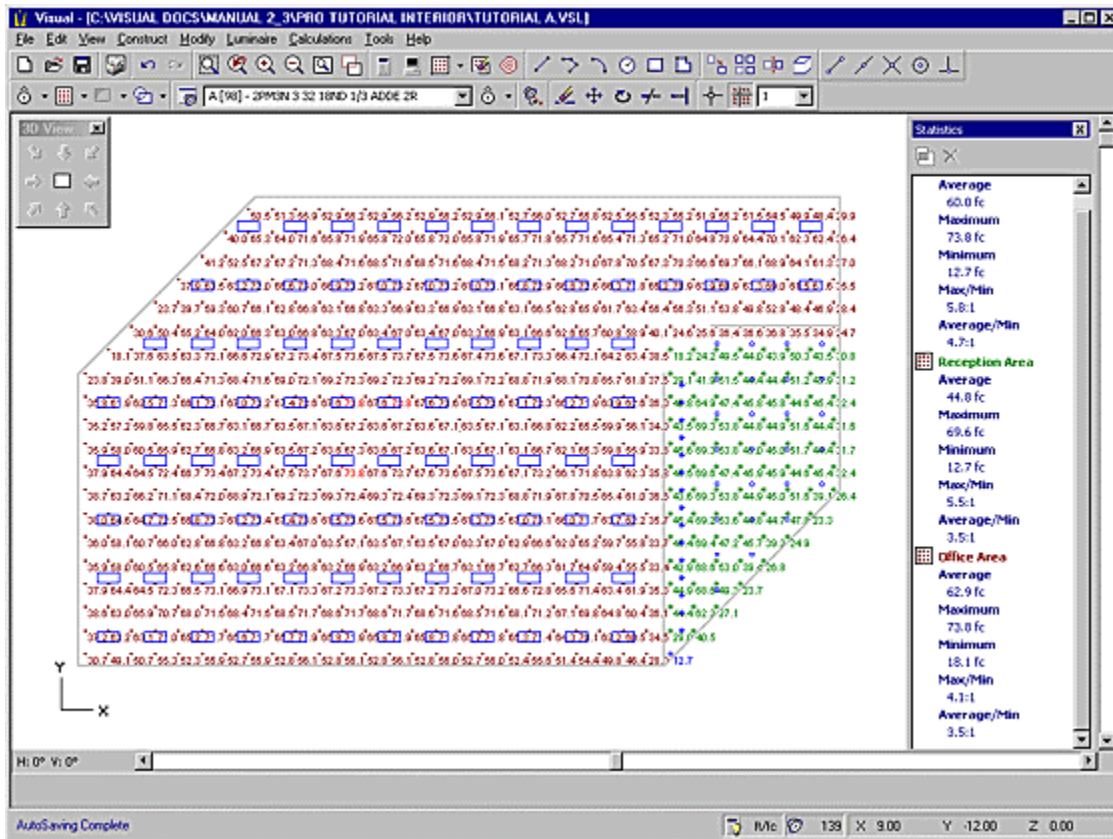
The model is now complete and ready for analysis.

- Select **AUTO CALCULATE** from the **CALCULATIONS MENU** to enable the feature in the event adjustments are required.
- Visual will analyze the lighting model. The Status Line will report the different calculations being performed and a blue progress indicator will appear on the Status Bar to inform you of the progress of each calculation. When Visual is finished, the calculation points will display their associated numerical illuminance values placed next to them.
- Choose **STATISTICS** from the **CALCULATIONS MENU**, the **Statistics Window** will be appear and report the statistical results for the Calculation Zone as a whole as well as each of the two defined zones.

The calculation grid is quite dense and may be difficult to read.

- Select **PROPERTIES** from the **EDIT MENU** and select the Calculation Zone for editing.
- Right Click to end object selection and launch the **Properties Form**.
- Under the Properties heading, change the Row and Column spacing values to **4** rather than 2 and select **OK**.
- Visual will recalculate using the new spacing.

Your screen should appear as shown below.

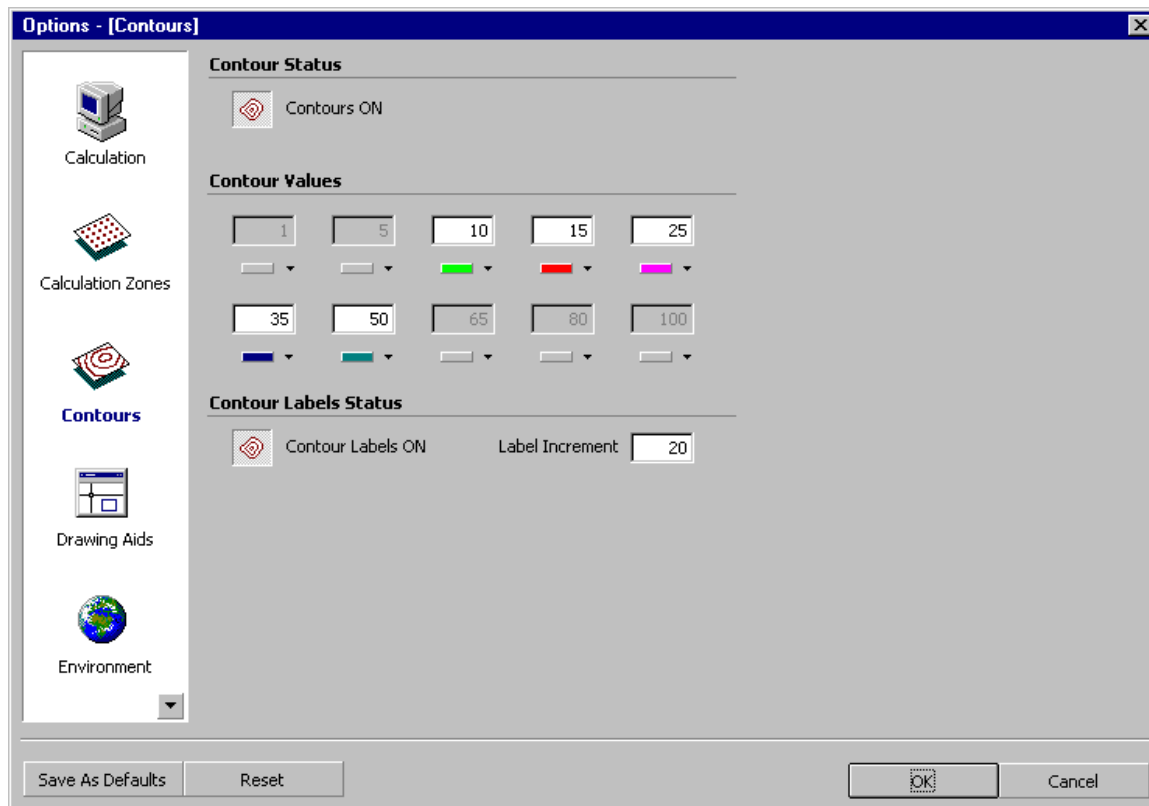


The statistics indicate average illuminance values of 44.8 footcandles in the Reception Area and 62.9 footcandles in the Office Area. Relatively minor differences in model construction can yield differences in these values. If your numbers are slightly different, just realize that the two models

are not absolutely identical and continue. If your values are substantially different, it may be wise to retrace your steps and attempt to identify the problem. Note that the maximum values are shown in bright red and the minimum values are shown in blue.

Sometimes it is helpful to add iso-illuminance contour lines to the calculation zone to graphically depict the distribution of illuminance.

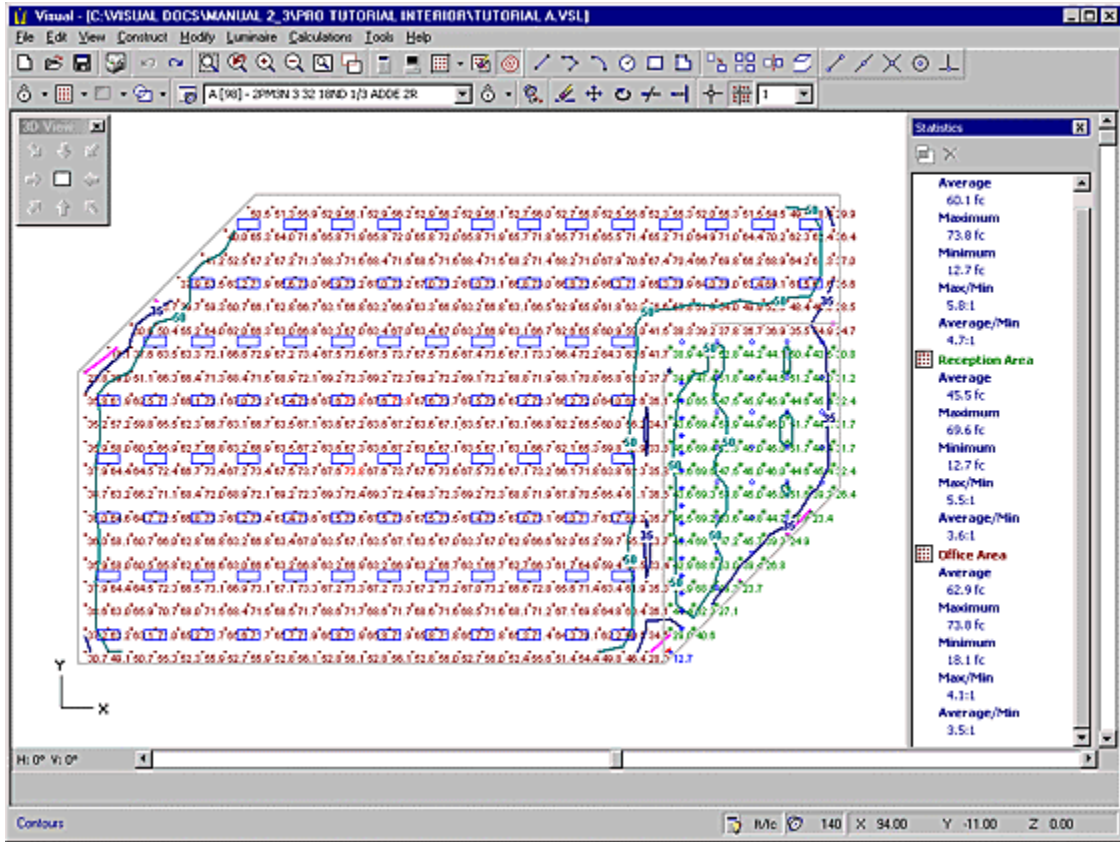
- Select **OPTIONS** from the **TOOLS MENU** to launch the **Options Form**. The **Contours** category will be displayed by default.
- Turn the iso-illuminance contours on by toggling the button under the **Contour Status** heading. The contour colors and options should appear as indicated below. If not, edit the values and colors to reflect these values.
- When finished editing the values and colors, select **OK** to close the **Options Form** and apply the changes.



Upon returning to the **Design Environment**, the iso-illuminance contours should be added to the calculation zone. One area that immediately draws attention is the transition between the Reception Area and the Office Area. Since the magenta iso-illuminance contour corresponds to the 25 footcandle line, it represents a region whose illuminance is less than 25 footcandles.

- Select **PLACE** from the **LUMINAIRE MENU** and locate an additional downlight (Luminaire Type B) in the transition area and in line with the other fixtures (103,53,0). Remember to edit the **Mounting Height** field to place the Luminaire at **9'** above grade. The **AUTO CALCULATE** feature will automatically update the model to reflect the contribution of the additional Luminaire.

You will see that the light level in the area of concern has gone up substantially and the average light levels have gone to 45.5 and 62.9 for the Reception Area and Office Area respectively. At this point, the lighting model is sufficiently uniform and will be considered complete for the purpose of this tutorial.



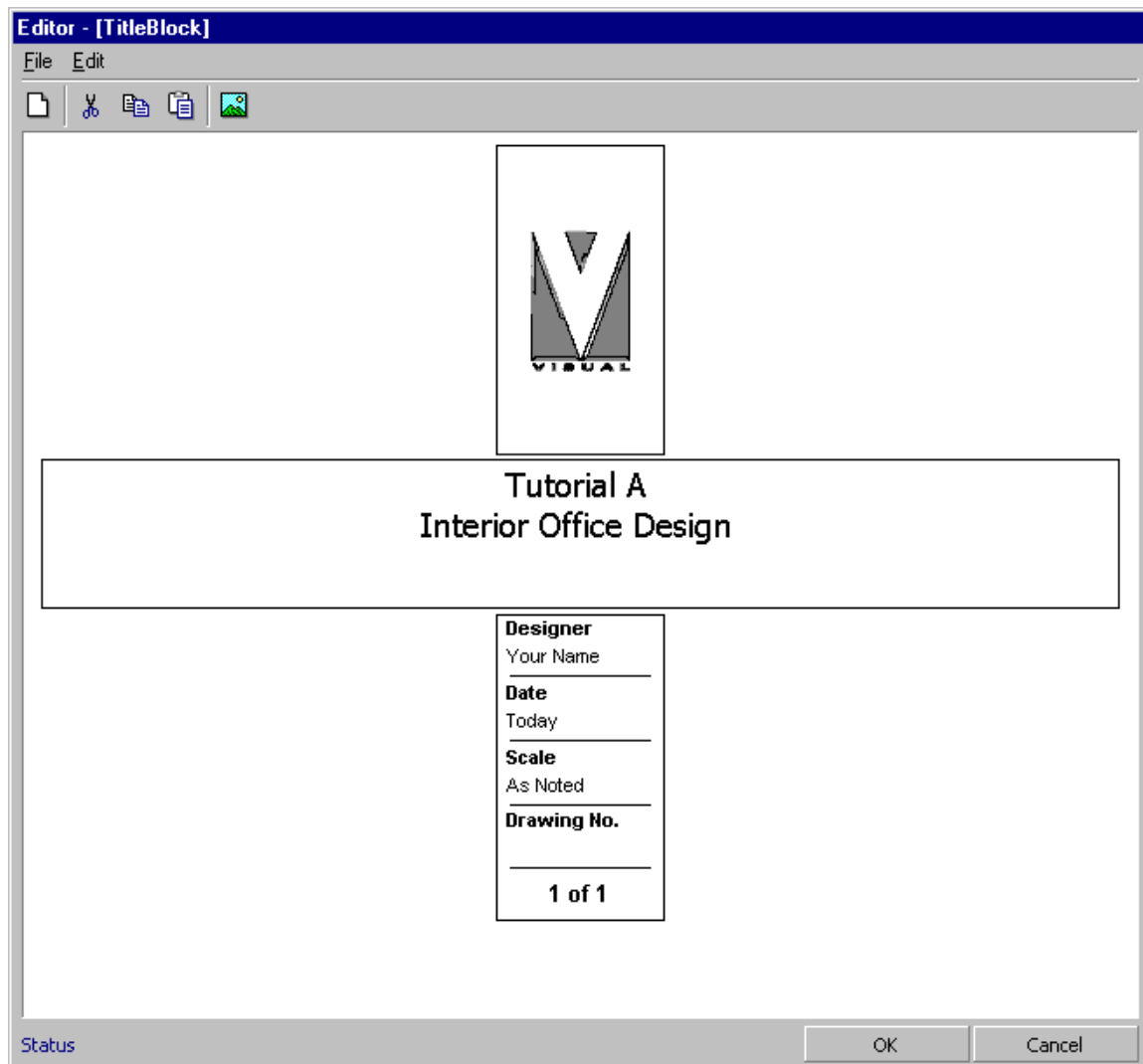
Composing Output

Now that the lighting model is complete, you will use the **Print Editor** to compose pages for printing.

- Select PRINT EDITOR from the FILE MENU.
- If your system is configured for multiple printers, select the desired one from the drop-down list box on the left side of the Toolbar.

The default paper size and orientation should be reported on the PAPER SIZE button located on the Toolbar.

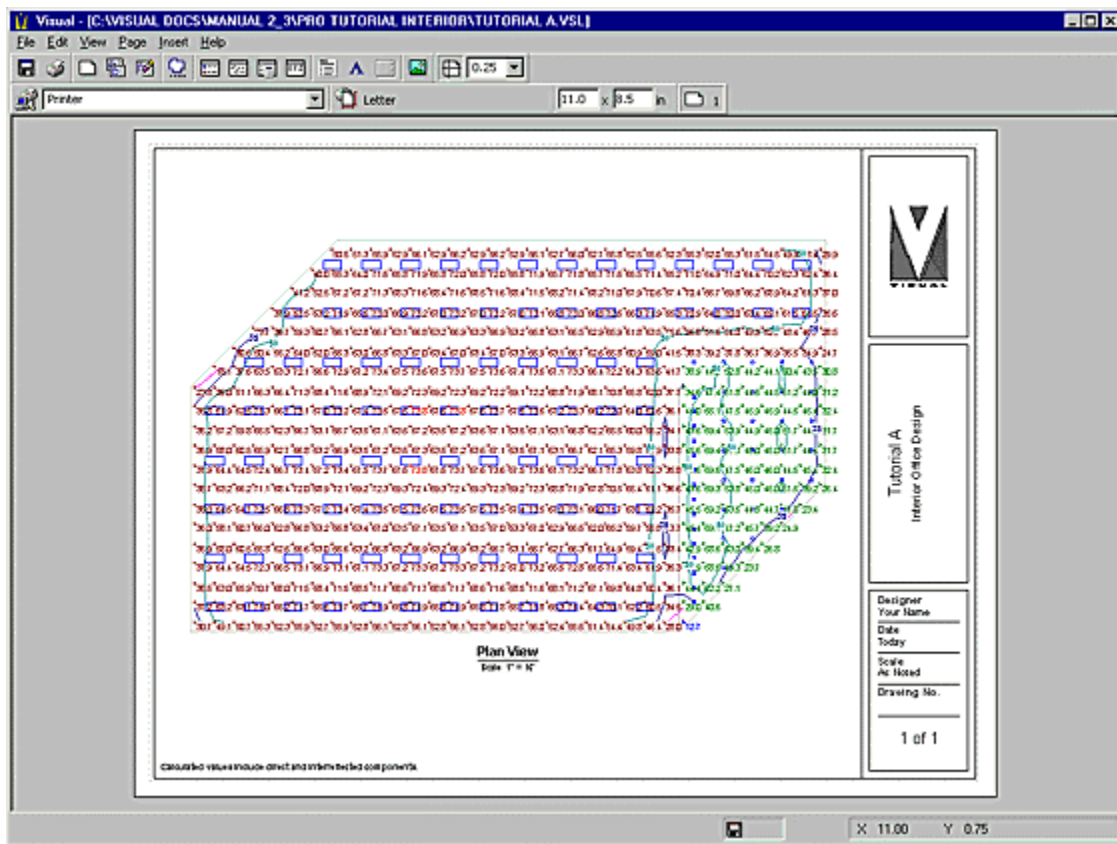
- Select Landscape orientation and Letter size paper if this is not already the default by pushing this button. The dialog box that will appear is different depending on the printer being used.
- Add a Title Block to the page by selecting TITLE BLOCK from the INSERT MENU. The **Title Block Editor** will be launched.
- Edit the Title Block fields by placing the cursor in the appropriate locations and typing.
- Enter the information as presented below and select OK to insert the Title Block.



The Title Block should now be added to the page with the appropriate information. If a mistake was made, simply Double Click on the Title Block to launch the Editor once again.

- Indicate your intent to place a plan view of the model by selecting ILLUSTRATION followed by PLAN VIEW from the INSERT MENU.
- Draw a rectangle to contain the illustration on the paper by selecting opposite corners of the rectangle. The implied rectangle will be drawn once the first corner is chosen. After selecting the second corner, the graphic will be automatically drawn within the rectangular area and the appropriate scale will be displayed beneath it.
- Launch the **Illustration Editor** by Double-Clicking on the Illustration. Toolbar buttons allow various aspects of the Illustration to be toggled on and off.
- Configure the toggles to include calculation values, include contours, and include title. All other toggles should be off. This is accomplished by Left-Clicking on the appropriate button.
- Left Click the OK button to exit the **Illustration Editor**.

Your page should appear as shown in the graphic below.



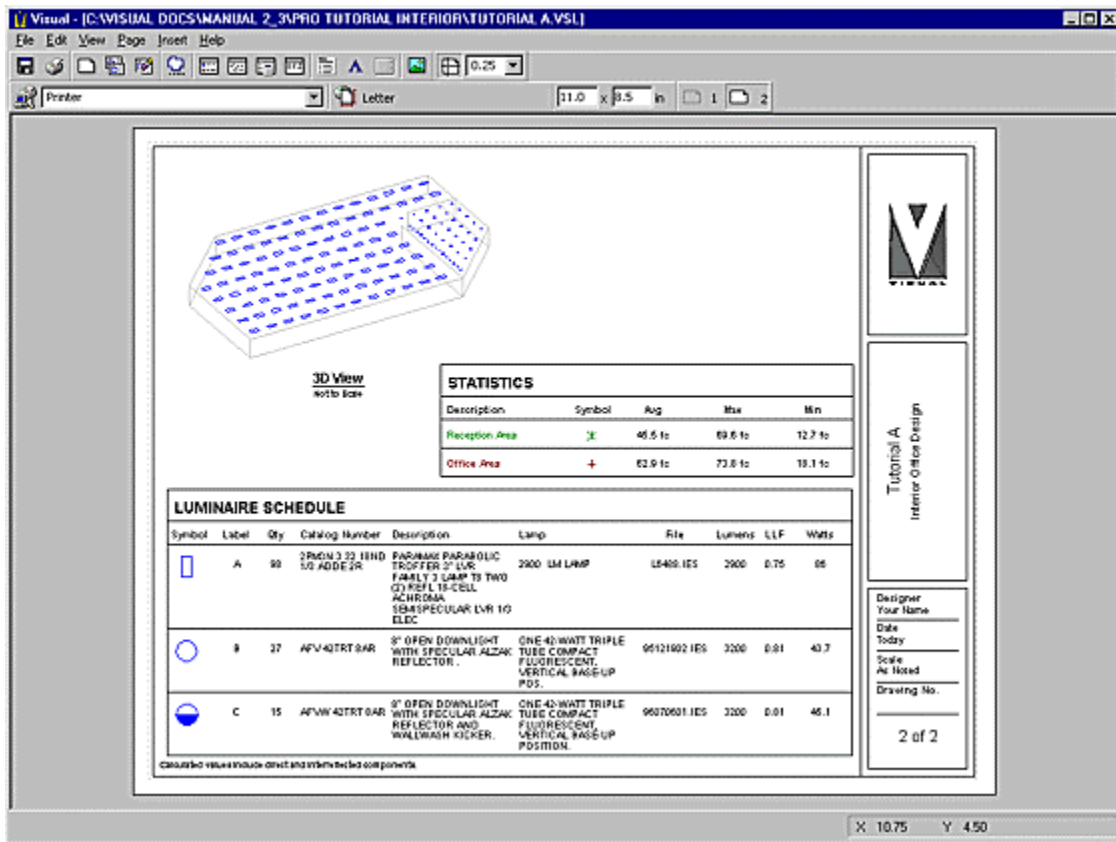
Create a new page by selecting NEW from the PAGE MENU. The Toolbar will reflect the addition of the new page and the blank page will be selected and presented for composition.

- Return to the first page by selecting PAGE 1 on the Toolbar.
- Select the Title Block by Left-Clicking on it and copy this information to the clipboard by selecting COPY from the EDIT MENU.
- Return to the second page by selecting it from the Toolbar, and paste the Title Block onto the new page by selecting PASTE from the EDIT MENU. The Title Block will be inserted on the second page identically with the exception of the page numbering at the bottom.
- Turn off the Incremental Snap by clicking on the Snap toolbar icon.
- Add a copy of the Luminaire Schedule to the second page by selecting LUMINAIRE SCHEDULE from the INSERT MENU. The Schedule will be automatically sized and attached to the mouse.
- Place the Luminaire Schedule in the lower section of the page with a Left-Click.
- Add a statistical summary by selecting STATISTICS from the INSERT MENU and following a similar process.
- Place the statistical summary to the right side above the Luminaire Schedule.
- Double Click on the statistical summary to launch the STATISTICS EDITOR.

Columns within the statistical summary may be toggled on or off by selecting the column header. Since this design is primarily based on an average illuminance criterion,

- Toggle both the Max/Min and Avg/Min columns off leaving only the average, maximum, and minimum values reported.
- Also toggle the full Calculation Zone entry off by selecting the row and Left-Clicking on the EXCLUDE button on the Toolbar. This leaves only the two specified Statistical Zones in the summary.
- Select the OK button to return to the **Print Editor** and accept the changes.
- Finally, position the resulting summary in the upper right portion of the page.
- To finish the composition, add a 3D view of the model to the upper left portion of the page by selecting ILLUSTRATION, 3D VIEW, and then SOUTH-WEST from the INSERT MENU.
- Draw the required rectangle in the upper-left portion of the page and insert the illustration.
- Double-Click on the resulting graphic to launch the **Illustration Editor**.
- Toggle all options off except for the Title.
- Edit the Title in the lower section of the Editor to read "**3D View**" instead of "South-West View" using the mouse cursor.
- Click OK to accept the changes and return to the **Print Editor**.

Your page should appear as shown below.



Print the project by selecting PRINT from the FILE MENU. The Print dialog will appear. Select the pages you wish to print and select OK to send the information to the printer.

Exporting a File and Saving the Project

- Select CLOSE EDITOR from the FILE MENU to return to the **Design Environment**.
- To save an electronic file for importing design file information into another CAD program, select EXPORT from the FILE MENU.
- Choose the directory and filename as appropriate and select the OK button to write the file. The file automatically contains all information parsed into separate layers so that specific elements may be imported as desired on the receiving end.
- Save the project by choosing SAVE from the FILE MENU. The familiar **File Save Dialog** will appear.
- Choose the directory and filename as appropriate, followed by the OK button to save the file.