Indoor Lighting

This is a general tutorial that should give you a good idea how to light for an indoor environment.

Take a look at the final renders. Feel free to use them as reference as you progress through the lesson but try and do your own thing.
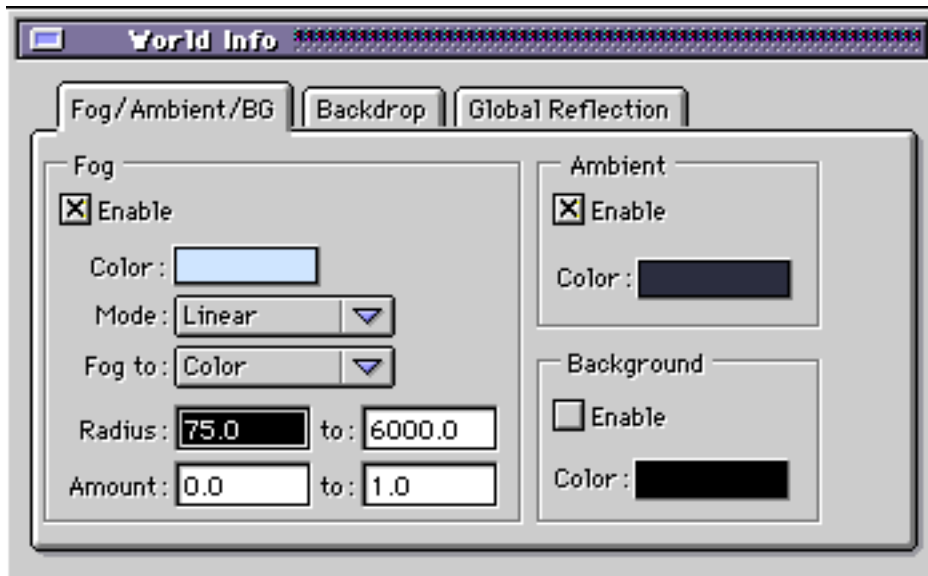
Open Desert_Saloon.Prj. I have modeled and textured a simple western style saloon that will serve as our environment. during this tutorial I will not be giving out numerical positions for lights. I want you to feel your way through this lesson. It's one thing to place a light and say, "yep, that's doing what he said" and another to feel your way through a lighting problem and really learn what is happening.

As you look at the project you will notice the models, a camera and one light currently in the project.

For the sake of speedy preview renders I've only left the walls, ceiling and floor turned on. These models are highlighted in red to make it easy for you to find them should you want to do a full render and then return to a minimum state.

Once again, it is important to work one light at a time and even one setting at a time as to not get ahead of ourselves. If possible, do test renders to see what each light setting is doing. It's really easy to start tweaking a light and end up further away from what you wanted.

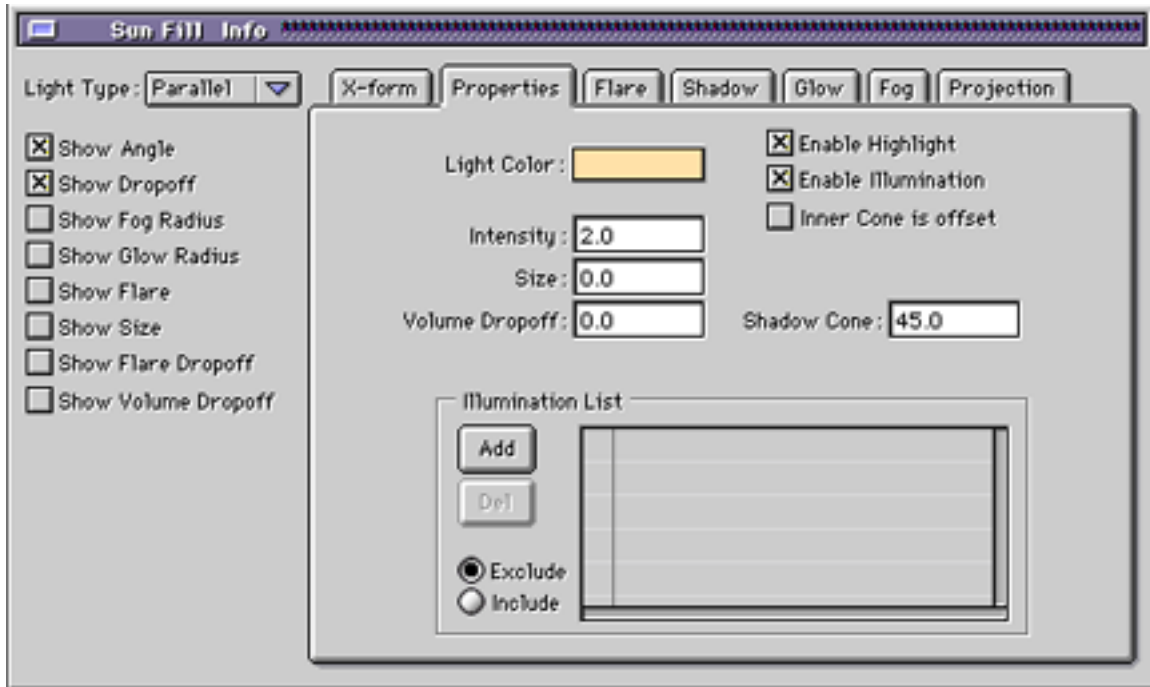Double click on the "World" object in the "project" window.

Click the "Enable" box in the Ambient side of the dialog box. Now click on the color box. Adjust the HSV sliders to H(233), S(31) and V(24). You will notice that this creates a dark blue color. This will be the color and brightness of the ambient light in our scene. Even though the time is day, we are inside a building and I want the ambient to be fairly dark but not so dark as to loose the ability to see into the shadows. This setting will defintaly give us the ability to get good brightness and color contrast between direct light, fill light and ambient light.

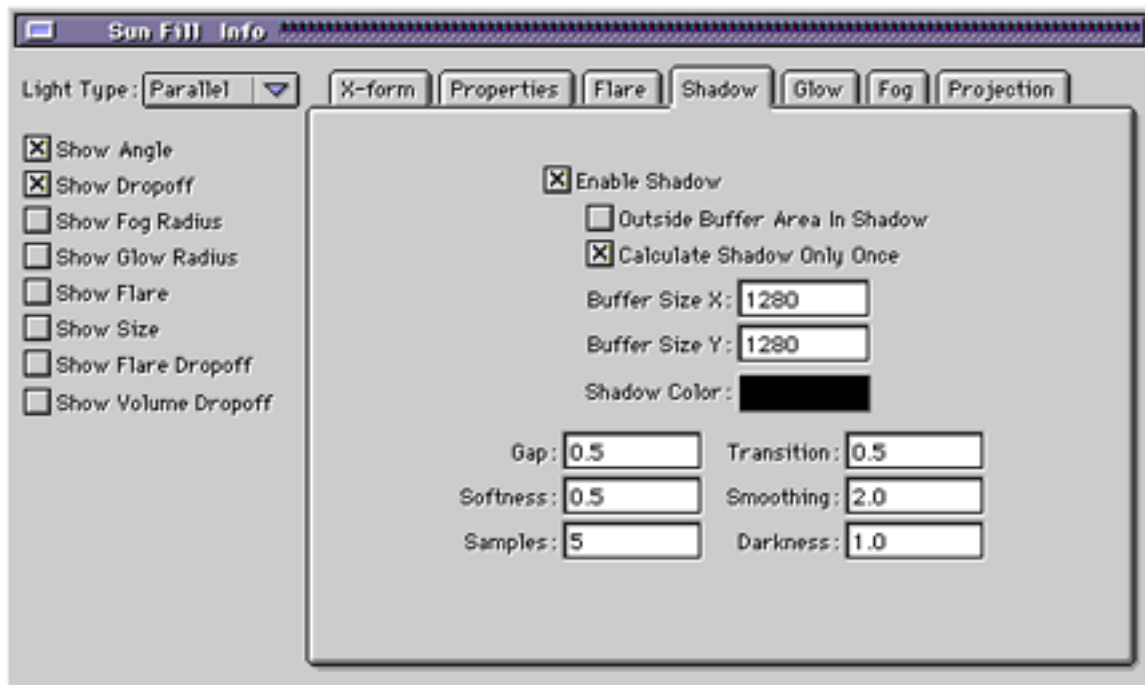I have the Enable Fog checkbox enagled as well. It is not necessary to have this on in your project.

Click once on Light1. Re-name it to Sun Fill then double click on it to bring up the dialog box for the light. Click on the menu under Light Type to choose Parallel.
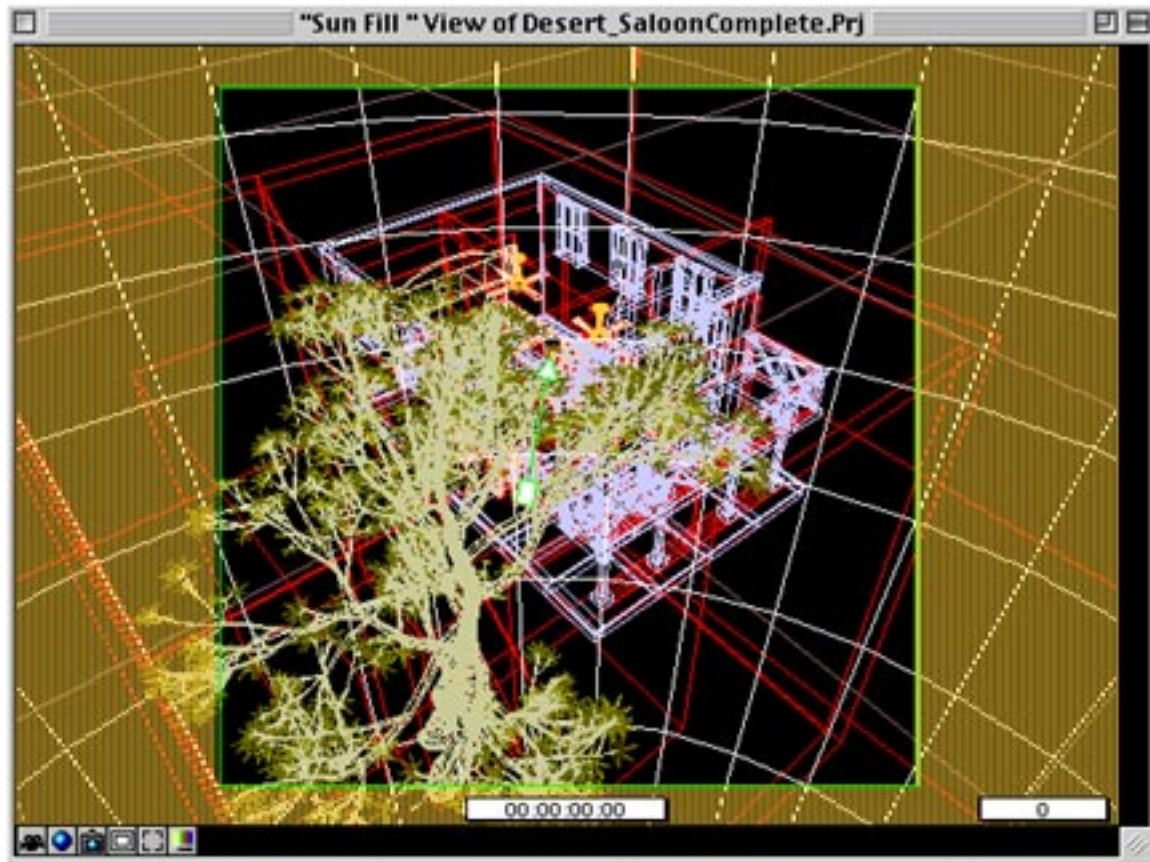
Click on the Properties tab.

We'll set the sun color to a nice warm tan. Click on the Light Color box and enter HSV values of 39, 34 and 100. Set the intensity to 2.0. We want nice bright sun that will create contrast but not overpower the scene with hot spots. We will leave Size and volume Drop-off at their default settings and be sure that the Shadow Cone is set to (45). We only want to cast a shadow over the saloon so 45 degrees should be adequate. Just Remember to keep the building in the cone.

Click on the Shadow tab.

Click on the Enable shadow button to turn the shadow on. We'll leave the buffer size's at 1280x1280. To get fairly straight sun beams into our room we'll have to place our light a medium distance away from the saloon. leaving the settings at 1280 will maintain the integrity of the shadow inside the building. We'll leave the shadow color at default so we get nice dark shadows inside the building. Change the Gap and Transition to (.5). We want to make sure we have shadows that start at the base of objects. Set the Softness to (.5) Because it's a nice sunny day we don't want the edge of the shadows to be too soft. the default smoothing value is just fine for our purposes. We'll also leave Samples and Darkness at their default settings.

This will be our sun. Because we a doing an indoor scene where our primary light source is from outside we want to position our sun carefully. In my finished example I have the sun fairly high in the sky but at enough of an angle so I get sun passing through the tree outside and then coming in the windows. direct sun through the windows will add greatly to the contrast of the scene and give us an obvious light source from which to base our fill lights. I encourage you to place the sun where ever you think it will work and look best. If you want to make sure the angle you picked will shine through the windows of the saloon hold down option and click on the top bar of the camera window.

From there select Sun Fill to look right down the barrel of the light. From this view you might find it easier to align your light using the orbit, pan, dolly, track and zoom commands.

Type command E to bring up the object palette. Three down on the left you will see a light bulb. Click hold and drag a new light into any view window. the initial placement of the light should be roughly opposite of the sun you positioned in your scene on the XZ plane. Generally you want the light to point down on your scene. Ambient is generally the blue part of the visible light spectrum that is bounced around the atmosphere and back to earth. this is, of course, is not entirely scientific but generally the case. because this light is very diffuse and non directional in nature it is easily overpowered and added to by direct light from any direct source.
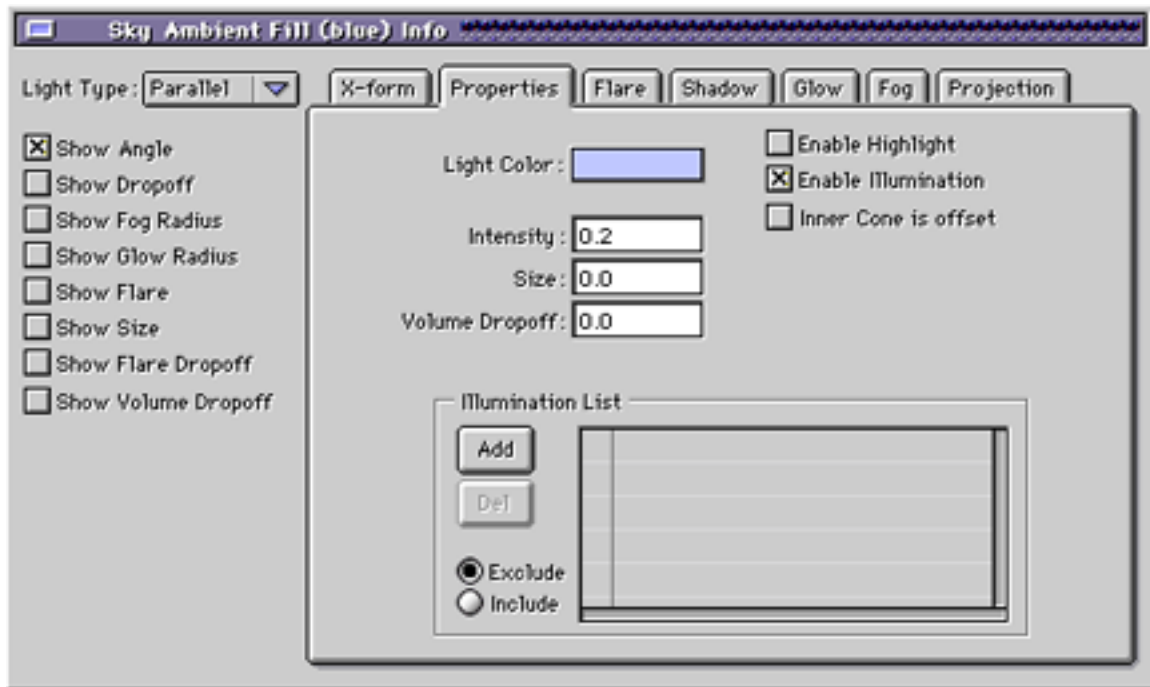
In the Project window you will see one new light entitled light 2. This will be our ambient fill light. Rename the light to "Sky Ambient Fill".

In addition to the "World" ambient we will be using a parallel light for directional ambient. the reason for using a directional ambient light instead of relying on world ambient is to help bring out the contrast in

bump maps and to create better shading falloff on objects in shadowed areas.

Double click on Sky Ambient.   Under light Type choose Parallel.
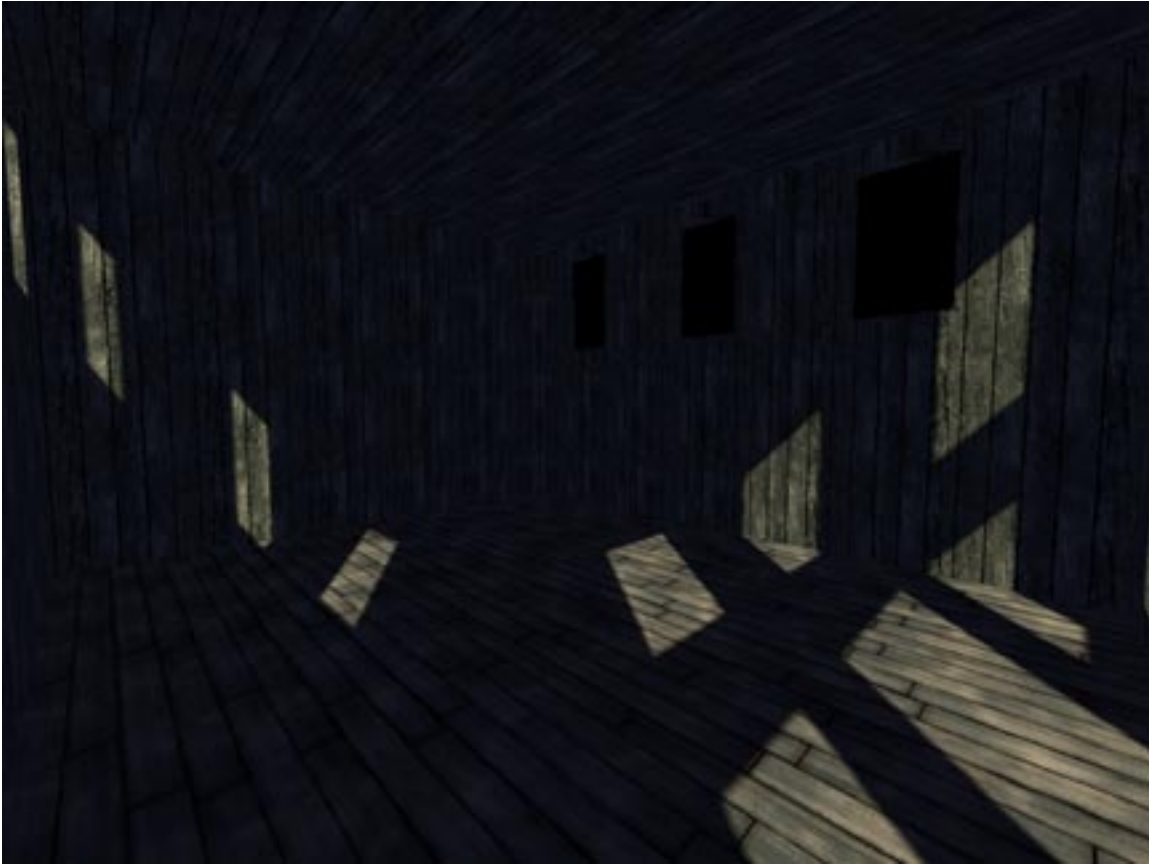
Click on the "properties" tab.

Set the light color to HSV 232, 25 and 100. Set the Intensity to (.2), Size to (0) and Volume Drop-off to (0). the Intensity setting of (.2) will be enough to bring out contrast in bump maps and shading drop-off but not enough to wash out the image or loose the contrast we want. Make sure the Enable Highlight Check box is NOT checked. there is no specific light source for ambient so there is most often no source for a highlight. Leave Enable Illumination on.

Click on the Shadow tab. Make sure "enable Shadow" is NOT checked. Again, since there is no specific source for ambient light there will be no cast shadows.

The next lights to consider are fill lights. Render a minimum (red objects) preview of the inside of the saloon. look at where direct sun light is falling on the walls and floor of the room. In general It will form a pattern. In my project where the light hits the walls and the floor it forms a sort of "V" shape

going from the back wall across the floor and off to the right side wall. I used this as a reference point at which to start filling in.

If you've looked at my completed project or the rendered image you may have noticed that all of the lights named with a "fill" on the end of the name are acting as fill lights and are at the exact same angle as the sun. That is, if you double clicked on any of the warm sun or fill lights and then clicked on the X-form tab in the info box you would see that the values for Yaw, Pitch and Roll are similar if not the same. keeping all the angles the same at first is a good way to make sure all light is consistent. Notice areas where direct sunlight is not present. The back right corner is darker with a nice contrasting blue ambient. This is also true of the left and front wall because there is no direct light going in that general direction. You may notice that the fill light almost follows the direct light in a broader "V"

Filling in more on the floor, high up on the left side of the back wall and right side wall.
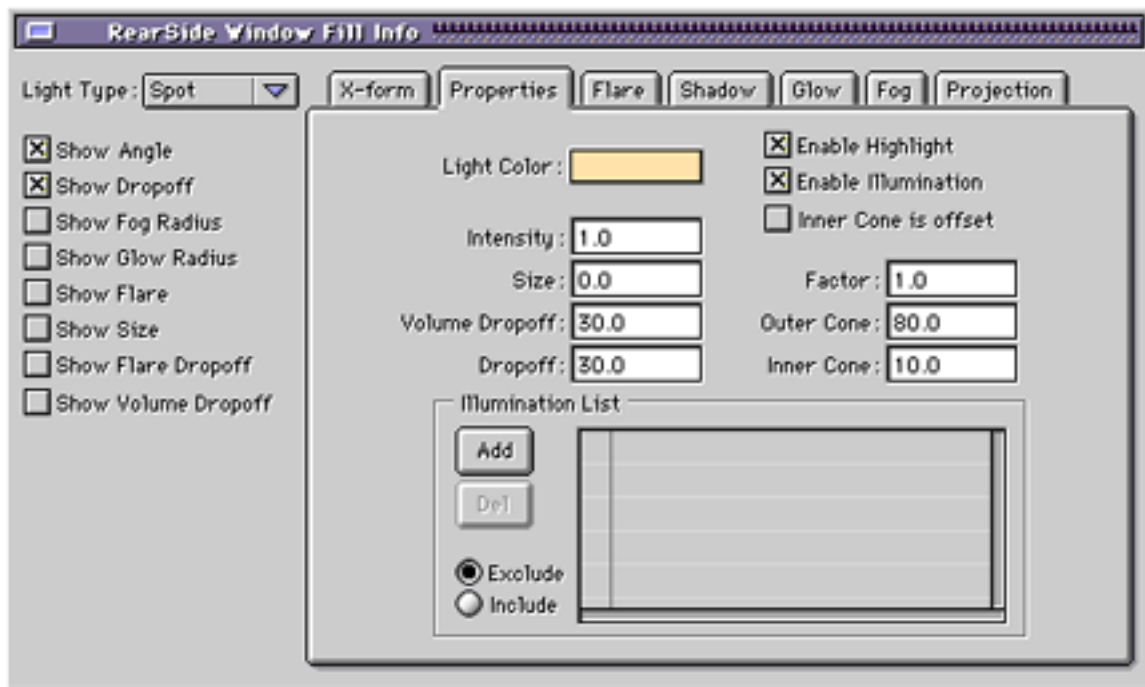
Add another light.

Re-name the light to "Window Fill". Double click on window fill to bring up the info dialog box.
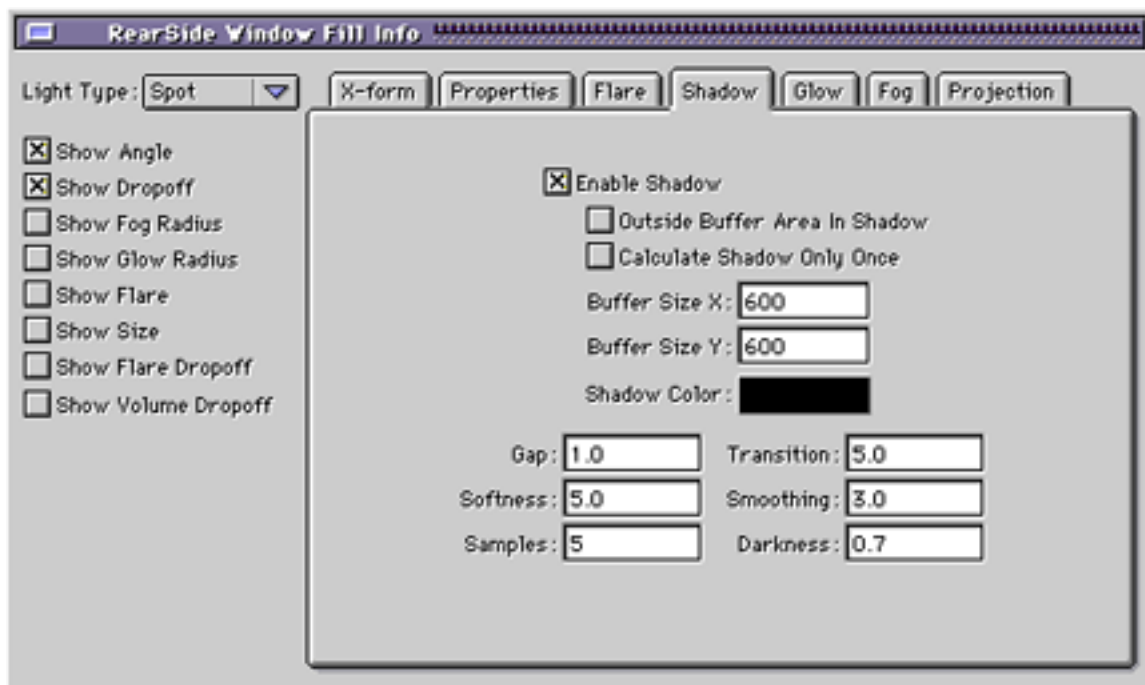
Change the light type to Spot.

Click on the Properties tab.

Using the sun as a reference change the color, Yaw, Pitch and Roll values to match. We want the fill light to have similar direction and color so it matches our direct sun light. For right now we are going to leave all other values at their default.
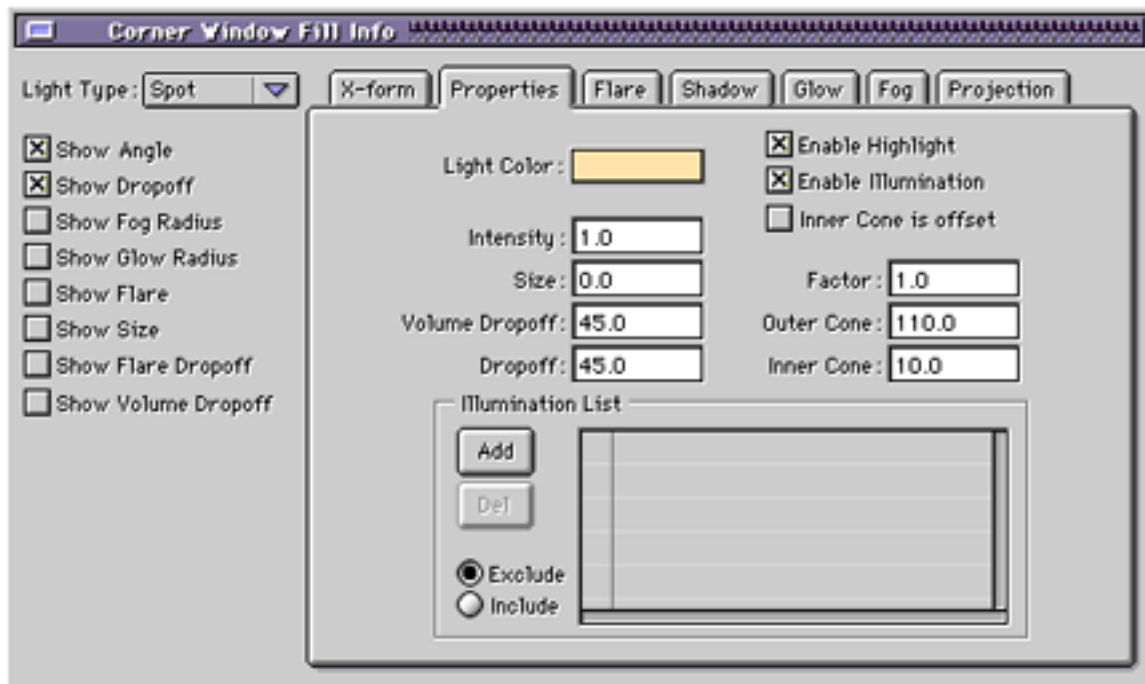
Click on the Shadow tab.

Enable Shadow by clicking on the check box. Change the buffer size to 600x600. Change the Softness value to (5) and the Darkness value to (.7). Leave the Shadow Color, Gap, Transition, Smoothing, and Samples at their default settings. For fill lights we want nice soft light that will cast soft radiant shadows under and around objects in the room.

Select the light and move it by clicking on the line between the source and the reference. this will make sure we don't change the Yaw, Pitch, and Roll values we set earlier. Move the light to a point inside a window where light is coming in. Make sure the light source is close to the wall so we have more room to spread the light out across a broad area.

When adjusting a soft fill light I try not to change the intensity settings of the light unless I have to. The default of (1) is plenty bright for most fill light.

There are three settings I adjust instead of intensity to get a nice soft fill light.

The first is to control the inner cone.

Since we want a nice soft fill and not an intense spot we want to give the light plenty of room to gradate between the inner Cone and the outer cone.

to this end I usually set my inner cone to a value of 0 to 10 depending on how fast I want my light to drop off to nothing at the outer cone.

The second value to change is the Outer Cone. Depending on how much area I want to try and cover, how soft I want my light, what direction I'm pointing and the distance to the target object will determine the value. For this example I have a outer cone range of 80 to 110. The larger the distance between the Outer Cone and the inner cone the more room your light will have to gradate between them. Thus, the softer the light will be. A larger value will also make it easier to blend multiple lights together to fill irregular areas or to make a fill pattern like the "v" in my example image.

The third is Adjusting the drop-off of a light to control the intensity of light hitting any given surface. It's important to get a good feel for adjusting drop-off so that the fill lights are not overly identifiable as direct spot lights. Typically a drop-off value must just pass the surface an object to give you very soft fill light. Varying the distances of the drop-off will change the type of light we are simulating between fill light and bounced light. Drop-off's that go further than the face of an object will feel more like fill light because they are brighter and tend to drop off more quickly from the center of brightness to the edge of darkness. Drop-off's that are even with or just past the surface of an object tend to feel more like bounced light or strong sky ambient because they drop off slower from the center of brightness to the edge of darkness.

Using the three concepts above the ultimate goal is to create a light so the drop-off on any given surface creates a even gradation from the middle where the light is strongest to the outside where the light drops to nothing. adjusting these setting correctly will help you avoid hot spots which could distract from the strong directional sun source and would look un-natural. Fill lights that are too bright can also destroy the contrast between the bright direct sunlight and the softer ambient.
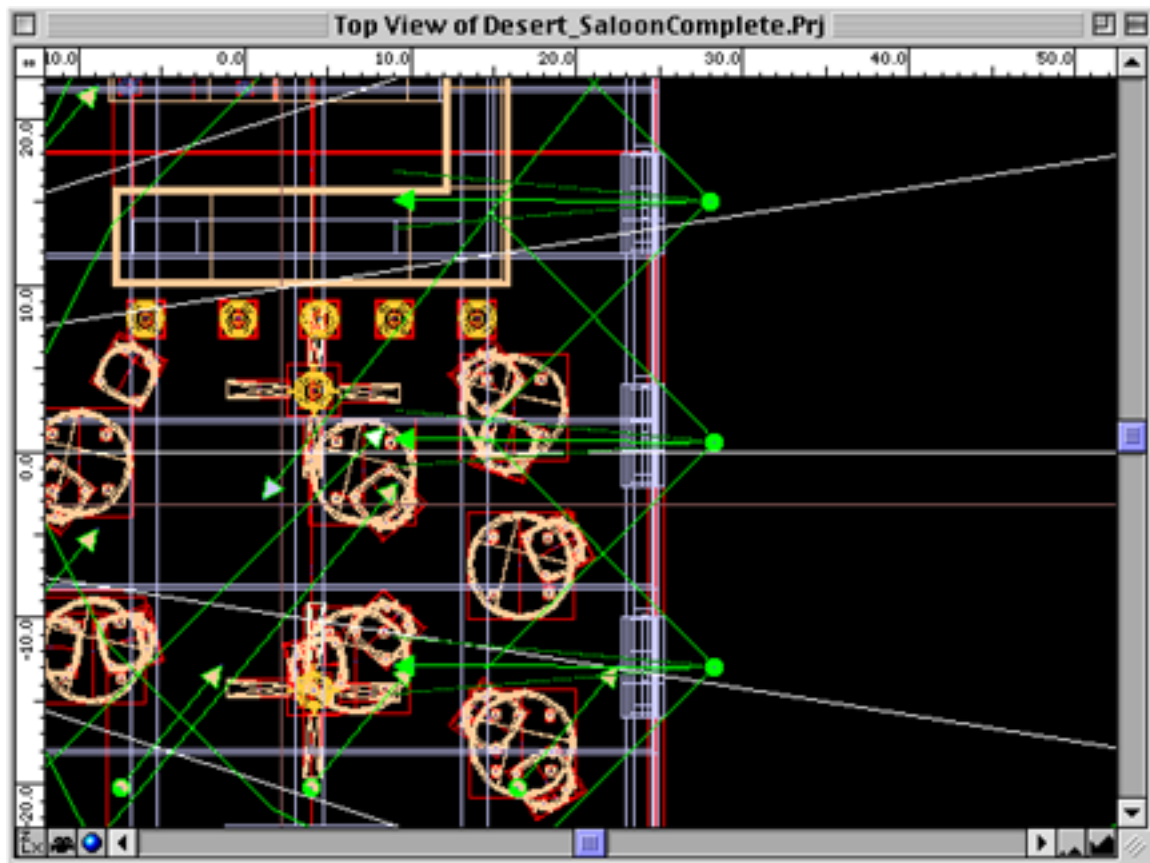
When I first put a Spot light in a scene I leave most or all of the values at their default. I position the light and do test renders to make sure I know exactly what area is being lit. In the case of the saloon I added and positioned all the fill lights with no drop-off so I could tell were they were filling.

Next I'll adjust the inner and outer cones using the above technique to fill the area I want. During this step in the saloon I moved the lights around quite a bit trying to cover the "V" area described above. I changed the
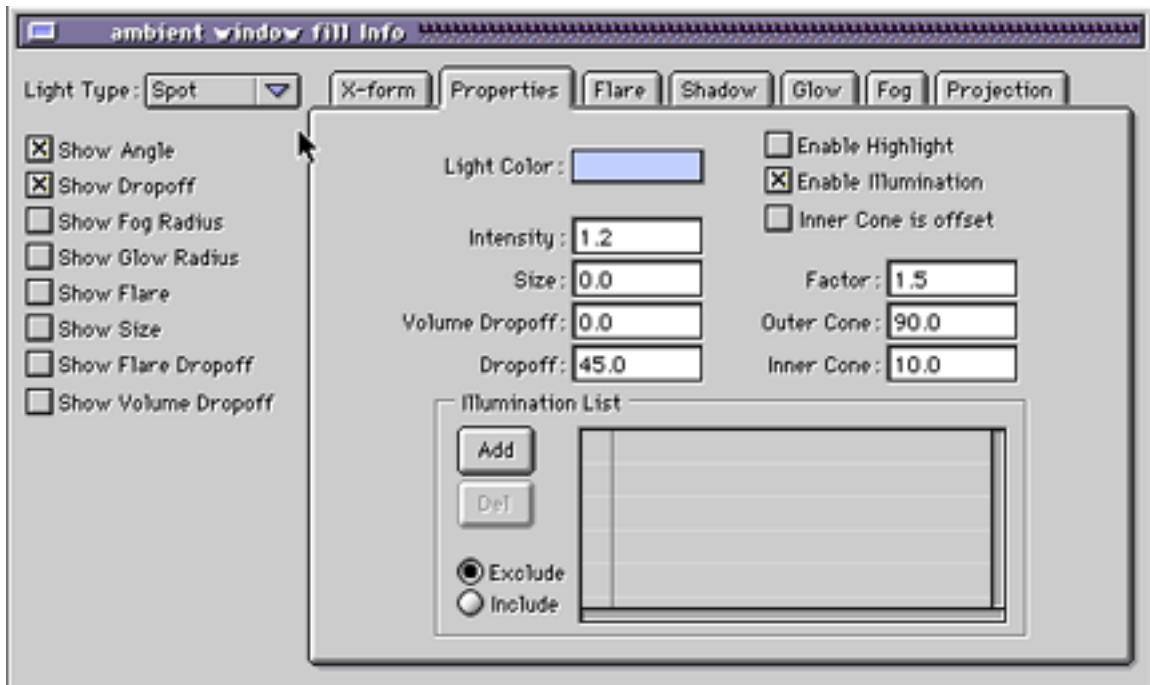
positions and number of lights several times until I was happy with the area I wanted to fill in.

I then use the drop-off to moderate the intensity of the light across the surface adjusting it in and out until I had a nice soft gradated light. For this step I used the top view to see where my Drop-off was ending. I adjusted all of the fill lights at the same time using this method and then did a rendered test. There were areas where I had too much light and also areas where the light wasn't reaching or wasn't bright enough. I then had to adjust the drop-off both in and out to achieve a nice soft gradual transition between multiple lights. (to turn drop-off on go to the light info dialog box and check the Show drop-off dialog box.)

Another light source to consider is ambient reflection from the environment on the ceiling. You'll notice in my example project that I have three spot lights placed roughly down the middle of the three windows on the right wall. These lights do not cast shadows through the window frame. Instead I've turned the shadows off and adjusted the inner and outer Cones to align with the edges of the window in wire frame mode.

I have values of 90 for the outer cone, 10 for the inner cone and a drop-off of 45. This creates lots of soft drop-off space between the center and the edge of the light cones giving much softer results.

I've used a value of 1.2 for the intensity and set the Factor to 1.5. this will guarantee that this ambient light will show up over the world ambient but not look too intense.

It's that easy!

Actually it will take some time to get the feeling for how to fill in areas with soft light effectively.

This is not carved in stone but it is a good place to start when deciding how to place lights. Like I said above, work one light at a time and try all types of angles and light color to achieve the look and feel you are after.