

Projecting Video

by Chris & Trish Meyer, Crish Design (*formally known as CyberMotion*)

Tricks for having a 3D layer project onto others inside After Effects.

An interesting technique is to cause a piece of footage to appear to be projected onto other items, as if it was coming from a video or film projector. This can be done with the 3D capabilities of After Effects, but it requires knowledge of a little-known parameter: Light Transmission. In this tutorial, we'll show how to set up a 3D environment that takes advantage of Light Transmission to create this look plus share some tips on how to improve the final image, including sharpening (or blurring) the projection and cropping light from spilling around the edges of the image. We're going to assume you have at least passing familiarity with using 3D space in After Effects, so that we can focus on the unique features you need to employ to create this look.

Building the Room

To catch our projected light, we created a wall and floor in After Effects by taking two still images of concrete surfaces (from the Artbeats Exteriors collection), enabling their 3D Layer switches, and rotating the floor by 90° on the X axis to flip it into a horizontal position. To make it easier to line them up, we moved the wall's Anchor Point to its bottom edge, and the floor's Anchor Point to its back edge. This way, we can enter the same Position value for both, and their edges will meet. We placed a Null layer at the same position (with its 3D Layer switch also enabled), and parented the two surfaces to the null to make them easier to move as a group.

Artbeats still image collections often contain seamless tiles, which means we can lay copies of the same image end-to-end to create one large continuous surface. The easiest way to do this in After Effects is to apply Effect > Stylize > CC RepeTile to one image, and use this plug-in's Expand parameters to extend the floor and wall as far as needed.

Finally, we added the footage we wish to project, and enabled its 3D Layer switch. We kept it at Z=0 as a

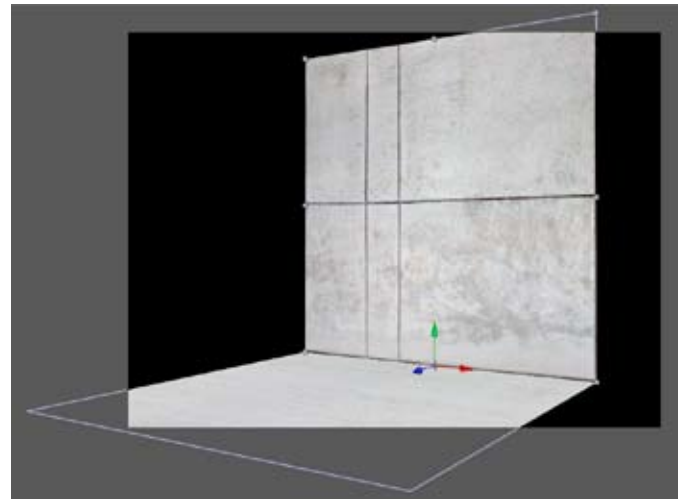


Figure 1a

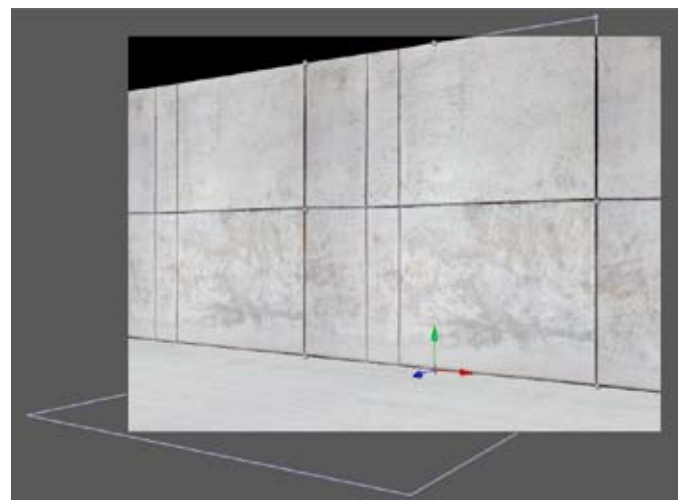


Figure 1b

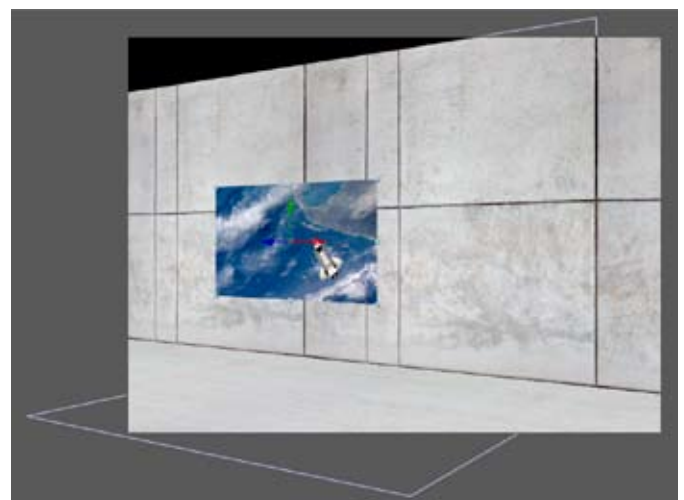


Figure 1c

Figure 1: We built a simple wall and floor using the still images *Concrete Panels 2* and *Textured 1* from the Artbeats Exteriors collection (a). As these images are provided as seamless tiles, we used the CC RepeTile effect to extend them beyond the edges of our shot (b). We then added our footage to project: clip *RBL101H* from the Artbeats Orbital HD collection (c).

simple reference point, pushing the wall and floor away from it in the positive Z direction, knowing our camera will eventually be placed in the negative Z direction (its default).

Lights and Shadows

The technique of projecting a layer's pixels onto another is a variation of having a layer cast a shadow. To do this, you must add a 3D light to the scene, enable the light to Casts Shadows, and also enable the projecting layer to Casts Shadows as well. The keyboard shortcut for both is Option+Shift+C on Mac (Alt+Shift+C on Windows). Increase the light's Shadow Darkness parameter to 100% to optimize the projection, and start with Shadow Diffusion = 0.

What type of light you use depends on how you want the projection to react. Setting the light's Type to Parallel results in a shadow (and therefore, projection) that is actually the same size no matter how far away the other layers are. If these shadow-catching layers are farther away from the camera than the projecting layer, then the shadows will appear smaller due to 3D perspective. On the other hand, setting the light's Type to Spot results in a shadow that grows in size as the shadow-catching layers are placed farther away. If the projecting light is in front of the camera, these shadows will appear larger than the original, even taking 3D perspective into account. If the projecting light is behind the camera, the shadows will still appear smaller due to the affects of 3D perspective.

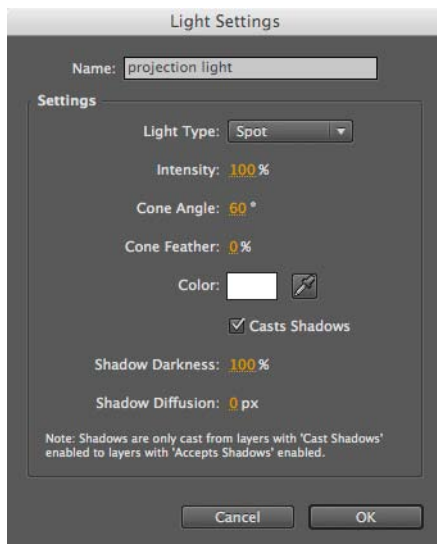


Figure 2a

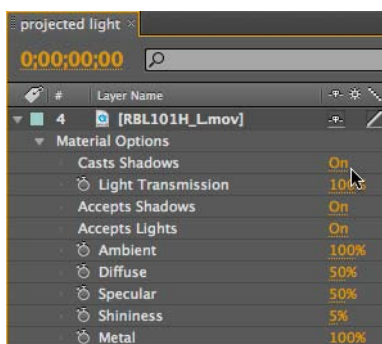


Figure 2b

Figure 2: Both the projecting light (a) and the projecting layer (b) must have their Casts Shadows parameters enabled.

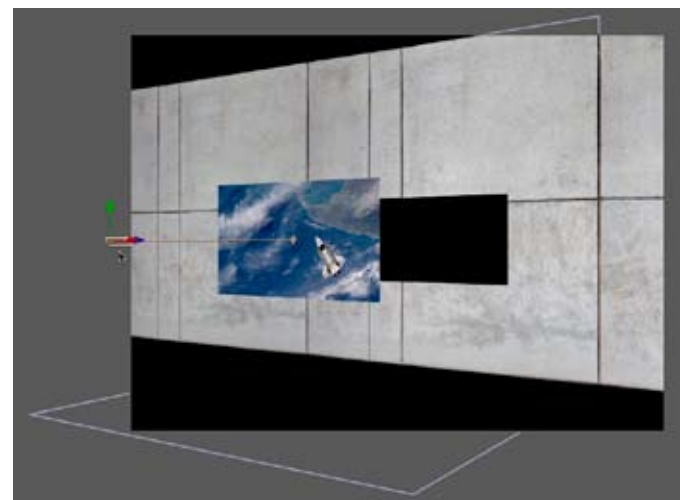


Figure 3a

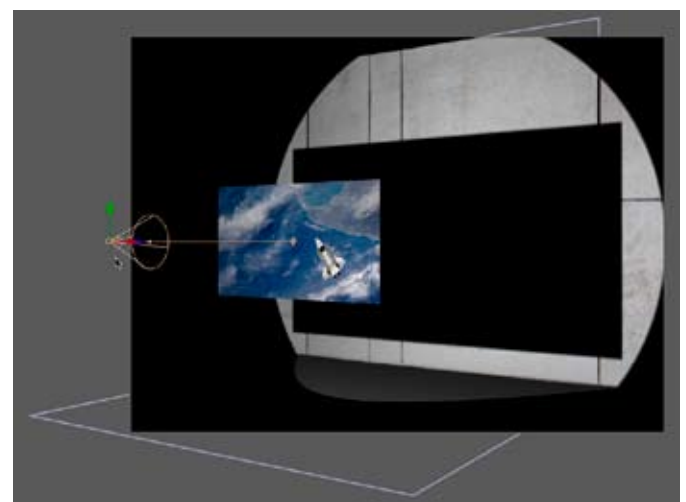


Figure 3b

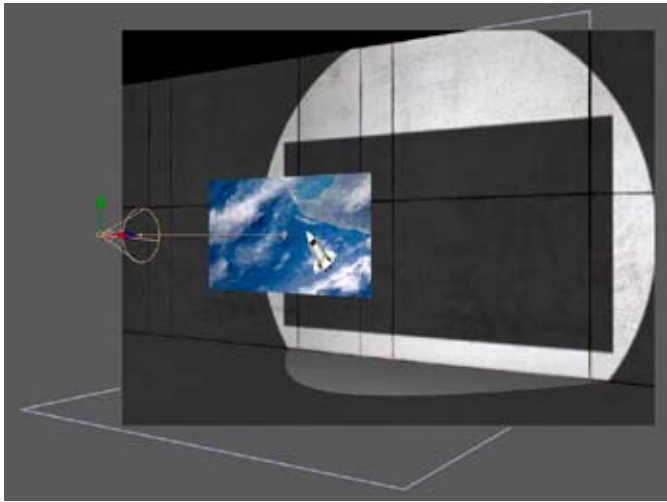


Figure 3c

Figure 3: Parallel lights tend to cast shadows which appear smaller than the original image (a); Spot lights will cast shadows which appear larger than the original (b) as long as they are placed closer to the shadow-casting layer than the camera is. Add a second light to help fill in illumination beyond the projecting light's cone (c).

To help manage our projection, we set the Point of Interest for the projecting light to the same value as the Position for the projecting layer, and then move the light's Position so that the light aims straight at the layer (if you haven't rotated the layer, that means using the same X and Y position values, with the Z value affecting the size of the shadow for a Spot light). We then parent the light to the projecting layer to make it easy to move them as a group.

As this light will eventually be used solely to project the video, you may want to add another light to help brighten the overall scene. For the sake of this tutorial, we added a light with its Type set to Ambient to add an overall illumination; we set its Intensity rather low so as not to overwhelm the projected light.

Projecting the Image

Next comes the central trick to this technique: The Light Transmission parameter. Light Transmission is sort of a "blend with original" setting for the shadow. When Light Transmission is set to 0%, the shadow is black. When it is set to 100%, the shadow takes on the color of the original image.

Select the video layer you wish to project, and type AA (two As in quick succession) to reveal its Material Options. Scrub its Light Transmission parameter from 0 to 100%, and note how the shadow changes to a projected light!

Depending on where the camera is positioned, you might see both the original layer and its projection. If you only want to see the projection, click on the projecting layer's Casts Shadows parameter until it changes to Only: This will turn off the layer and keep the shadow.

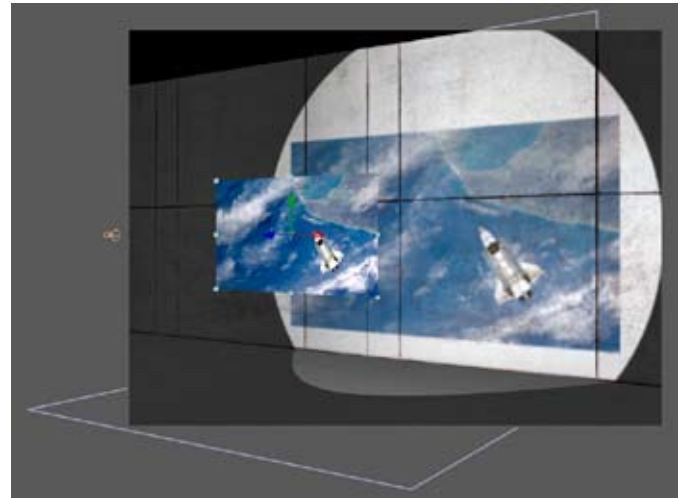


Figure 4a

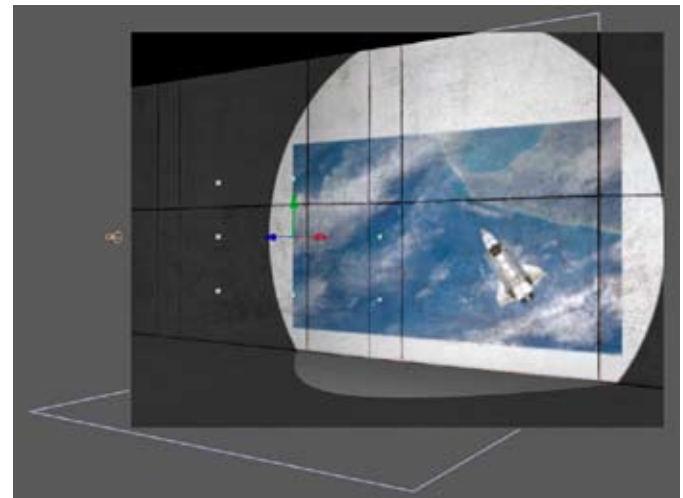


Figure 4b

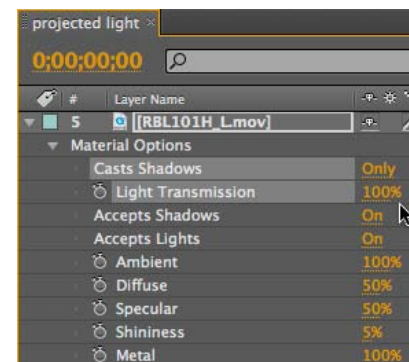


Figure 4c

Figure 4: By scrubbing the projecting layer's Light Transmission parameter to 100% (a), the shadow will take on the color of the layer itself (a). Toggle its Casts Shadows parameter to Only, and you will see just the projection - not the original layer (b). The final parameters are shown in (c).

Tips & Tricks

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You might notice that the projected image is a little fuzzy. If you want to make the projection even fuzzier, increase the light's Shadow Diffusion parameter. If you want to make the projection sharper, set Shadow Diffusion to 0, and open Composition > Composition Settings. Click on the Advanced Tab, and then in the section for Rendering Plug-in click on the Options button. Inside here you can set how many pixels are used to render the shadow. Higher settings result in sharper shadows. Note that increasing either the Shadow Map Resolution or Shadow Diffusion will result in longer rendering times...

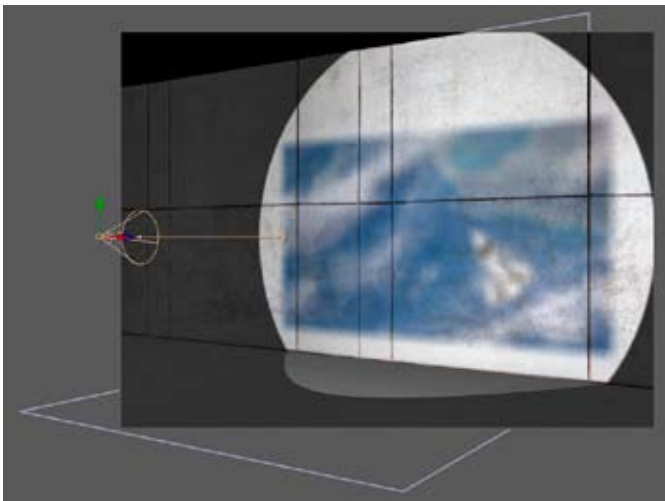


Figure 5a

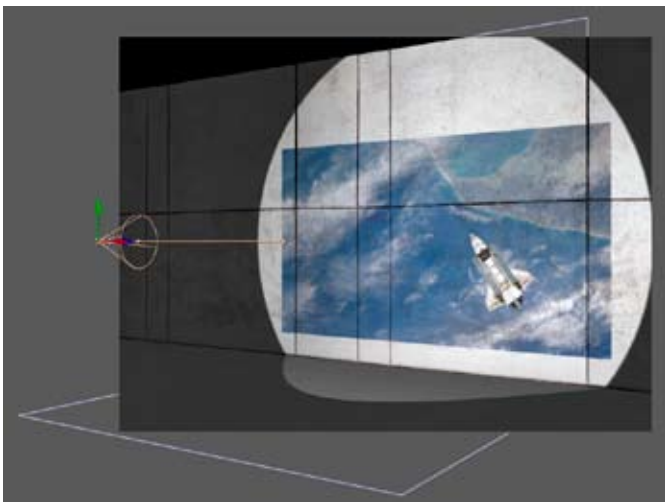


Figure 5b

Figure 5: To create an out-of-focus projection (a), increase the light's Shadow Diffusion parameter. To sharpen up the projection (b), open the Composition Settings, click on the Advance Tab (c), open the rendering engine's Options, and increase the Shadow Map Resolution (d).



Figure 5c

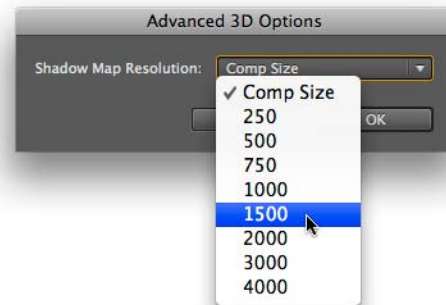


Figure 5d

Cleaning Up Leaks

You have a nice projection now – but you also can see the effects of projecting light beyond the edges of the projected image. If this effect is undesirable, there is a neat trick in After Effects to remove these “light leaks”: negative light.

Duplicate the projecting light to ensure that you have a second light with exactly the same parameters. Disable this second light's Casts Shadows parameter, and then set its Intensity to the negative of whatever its original value was (i.e. -100%). As a result, this second light will subtract itself from the original projecting light, leaving only the shadow.

As a result of removing the leaked light, the scene probably got darker. If desired, increase the Intensity of the “fill” light you created earlier to illuminate the rest of the scene.

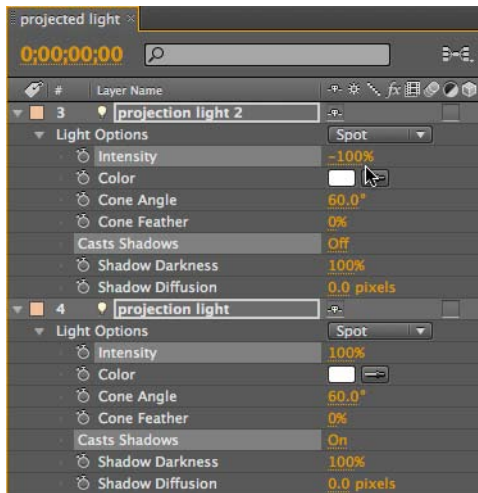


Figure 6a

Figure 6: Duplicate the projecting light, disable Casts Shadows, and set its Intensity to a negative value (a). As a result, the excess cone of light will now be subtracted from the scene, leaving just the shadow (b). Increase the Intensity of a fill light (such as an ambient light) to illuminate the rest of the scene (c).

Zooming Out

Projecting footage onto other layers is a lot of fun, yielding a different look than a normal composite. If you project the light onto multiple 3D objects placed at different positions in space, the resulting projection will appear in different sizes and perspectives on those objects. You can also have fun placing other layers in the way of the projection, creating interesting shapes and shadows.

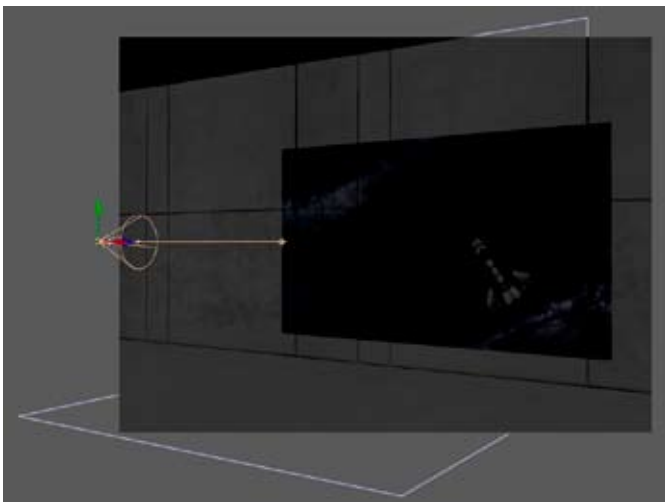


Figure 6b



Figure 7

Figure 7: The final projection tilted down to hit both the wall and the floor, with clip RET105 from the Artbeats Reticules collection added in.

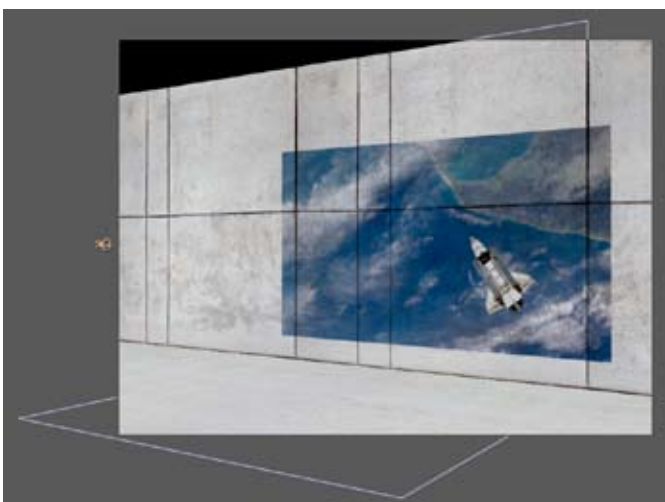


Figure 6c

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Chris and Trish Meyer are the founders and owners of Crish Design (formerly known as CyberMotion), an award-winning motion graphics studio that has created a wide variety of work for film, broadcast, corporate events, and special venues. One of the original development sites for After Effects, they have just released the second edition of the popular beginner's book, *After Effects Apprentice*.