1.1 Editing Assets to Fit Aged Aesthetics - Abigail Markish

1.1.1 Abstract

Through The Lens is a game with specific needs when it comes to any art assets. The visual design of the assets is dependent upon the look and feel of being abandoned and left to decay for decades. Therefore, any assets used that were not already specifically made to look like they were decaying had to be edited in a 3D modeling or image editing software. This paper aims to analyze the techniques used for the aging process along with deciding which technique was the most effective. After testing several techniques for aging assets, it was found that use of a decal system was the most extensible method, but the other methods presented were useful in their own ways.

1.1.2 Problem Statement

Through The Lens depends heavily on the separation of aged and clean asset textures. The main mechanic, here on out referred to as the photo mechanic, allows players to swap between how things look in the present versus how things looked in the past. Any assets based in the present would need to look aged and dirty while any assets based in the past would need to look new and clean. The biggest issue here was deciding which techniques would work best in achieving this aged aesthetic. From prior experience and further research, there were several options to choose from: editing models in Blender, repainting texture files in GIMP, and using a decal system in Unity. Which way would be most efficient, and which way would fit most of the project's needs?

1.1.3 Significance

Through The Lens centers around using our photo mechanic to create a connection between the current time period and the 1970s. This made creating an aged look for the present day version of our game's environment imperative to getting our aesthetic just right. While our team's 3D artist was able to create some of those aged assets for us, time crunches and other projects got in the way of creating every asset that was needed. This meant that we needed to find a way to edit any basic assets that were found on sites such as Sketchfab or TurboSquid.

Before this research was started, the team knew that we needed a quick way to edit any assets that our artist did not explicitly create. Upon researching the topic, several ways were discovered to support editing asset details to fit with the aged aesthetic. The significance of the issue fits within the realm of working quickly and accurately. Which technique would let us change our assets without significantly derailing our project timeline?

1.1.4 Background

Before creating the environment for *Through The Lens*, it was important to analyze how other narrative-heavy games with emphasis on aging and dilapidated structures accomplished this

task aesthetically. When thinking about games that place a heavy emphasis on exploring abandoned areas, a few examples immediately come to mind: *Horizon: Forbidden West* and *Fallout 4*. While *Forbidden West* and *Fallout 4* take place in the 31st century and 2287 respectively, they can still be used as good references for how I could create the aged aesthetic that we were going for in our project.

Figure 1. Image of a rundown relic location in Horizon: Forbidden West[1]

The team knew from the beginning that we wanted to tell a story using the environment of *Through the Lens*. We wanted to let players know what life may have been like for the fictional people that lived there before they had to abandon the area in the late 1970s. This same sentiment can be seen in the environment creation of *Horizon: Forbidden West*. As displayed in figure 1, the team at Guerilla Games created a completely dilapidated version of the Zion Lodge located in Zion National Park (ElAnalistDeBits 2022[2]). While our game may not need to portray real-world locations in the post-apocalyptic 31st century, there is still a need to make sure the 3D assets used in *Through the Lens* have the ability to depict a story. One can easily infer their own narrative about what occurred in the past just by looking at the above image. Games Radar writer Heather Wald describes *Forbidden West's* ruins as being the only things left that are still able to tell the stories of the past (Wald 2022[3]). Our game needed to have the same feel to it. By taking inspiration from *Horizon: Forbidden West*, we were able to get well on our way to making a game

[1] https://www.newgamenetwork.com/media/30699/horizon-forbidden-west/
[2] ElAnalistaDeBits, "Horizon Forbidden West VS Reality | Real World Locations Comparison," YouTube Video, 16:33, February 18, 2022, https://youtu.be/-fzqLBqzYX8?t=513.
[3] Wald, Heather. "How the Remnants of the Old World in Horizon Forbidden West Awakens a Sense of Wonder." GamesRadar+, March 2, 2022. Article Link.

that let players take their own guesses about what happened and why people left all those years ago.

Figure 2. Image of Red Rocket Truck Stop from Fallout 4[4]

Another game where inspiration was found for our project's aesthetics was Fallout 4. This game has a specific nuclear wasteland visual style, and the designers stuck with it from beginning to end. While the rusted and collapsed environments present in Fallout 4 were still too drastic for what our game needed to look like, it did give a slightly more approachable example of dilapidation compared to Forbidden West. Compared to the aforementioned far-future title, Fallout 4 still had visible infrastructure and structurally sound buildings. As shown in figure 2, objects such as the overgrown vegetation and the cracked roadways matched better with what we wanted to achieve. Through the Lens also used a bit of Fallout 4's inexplicit environmental storytelling as inspiration for our 3D assets. We wanted to let players figure out parts of the story on their own without having to be told directly. Aaron Rackham of CBR makes mention that finding hidden clues to side stories in Fallout may be more challenging, but this challenge also makes the outcome "a lot more rewarding (Rackham 2022[5])." This is what we wanted our players to feel by exploring and looking at the assets in the game's environment.

1.1.5 Methodology

The main purpose of this research was finding out what directions could be taken to make *Through The Lens'* 3D assets look more aged and abandoned. I had a working familiarity with

[4] https://fallout.fandom.com/wiki/Red_Rocket_truck_stop
[5] Rackham, Aaron. "Horizon Zero Dawn Masters a Storytelling Style That Started with Fallout." CBR, January 8, 2022. Article Link.

creating game-ready assets at the time, but I knew that there had to be more techniques out there that I had not yet heard of or tried. Upon further research and experimentation, three techniques were found that would be feasible for editing 3D assets to make them look more shabby and decayed: editing models directly in Blender, editing texture files in GIMP, and creating a decal system to be used within Unity.

Some of the assets found in asset stores such as Sketchfab looked great for our game visually, but the shape of their meshes had a few shortcomings. One route of experimentation that I took was to import the objects into Blender, edit their meshes directly, and then export them back for use in Unity. This technique allowed me to directly manipulate the faces, edges, and vertices of the meshes. In turn, any 3D assets that were used in our game could be made to look more rundown physically (not just visually by editing textures). However, there is a major limitation to this method that will be further discussed in the discussion section of this paper.

Another technique was the use of GIMP (GNU Image Manipulation Program) to edit texture files that would be used to create object materials in Unity. GIMP was used for image editing instead of Photoshop because it is free and open-source. Editing texture files to create aged versions of object materials was the goal for this technique. An albedo map (or the base material colors) would be opened inside of GIMP. This map would then be edited to look dirty or decayed. The map would then be imported into Unity to be used as the new base for an object's material.

The final technique (and likely the most technical to achieve) was the use of a decal system within Unity. A decal system would allow us to overlay images on top of objects to make them look old without having to edit said objects in other software. Due to our project being on an older and more stable version of Unity, a decal system had to be created from scratch. A built-in decal system with Unity's URP (Universal Render Pipeline) was only made available in the 12.0.0 version (Decal Renderer Feature[6]). After performing an extensive internet search, it was found that this same issue had been approached by a developer named Daniel Ilett (Daniel Ilett 2021[7]). By following his approach to creating decals using shader graphs in older versions of URP, the concept of overlaying textures onto 3D objects to make them look aged was able to be tested.

There are several factors that limit the possible scope of this research paper: time, motivation, and available resources. Time and motivation can be tied together when discussing these limitations. Most of the available time and motivation are being spent on creating a playable, satisfying, and undeniably strong prototype for *Through The Len*s. This leaves little room for research outside of immediate areas of study and expertise. Another limiting factor was finding resources whose creation techniques were easy to understand and replicate. Not every 3D artist uses the same techniques to create their assets, so it was difficult at times to find objects that followed approaches that I already knew how to manipulate. Learning how all of the different artists' techniques worked was nigh impossible. All of these things led to severe scope limitations while driving forward with this research.

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[6] "Decal Renderer Feature: Universal RP: 12.0.0." Unity3D Docs. Unity, n.d. Document Link.
[7] Daniel Ilett, "Decals & Stickers in Unity Shader Graph and URP," YouTube Video, 9:14, September 26, 2021, https://youtu.be/f7iO9ernEmM.

1.1.6 Results

Throughout the course of this project, I was able to use the techniques described above to make some assets look more aged and neglected. The following images are the results of all of the aforementioned techniques.

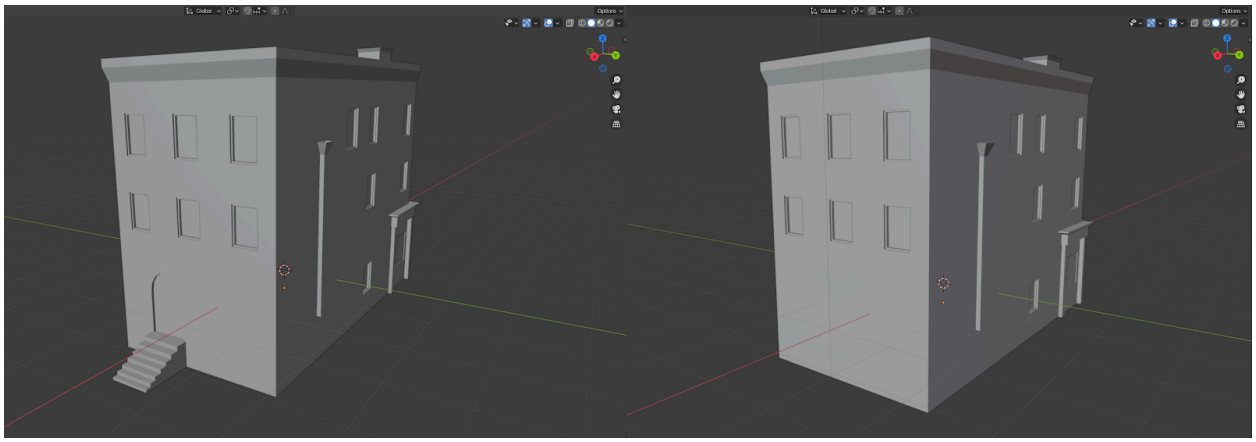

Figure 3. Building model with no textures before and after Blender editing

Figure 3 shows the basic building model that appears throughout the onboarding section of *Through the Lens*. The edited version of the model gets rid of the back stairs and entryway. They simply did not fit what we were looking for aesthetically for the city in our game, so the mesh editing technique was used in Blender. After getting rid of those specific pieces, the building was much easier to resize and manipulate within Unity itself.

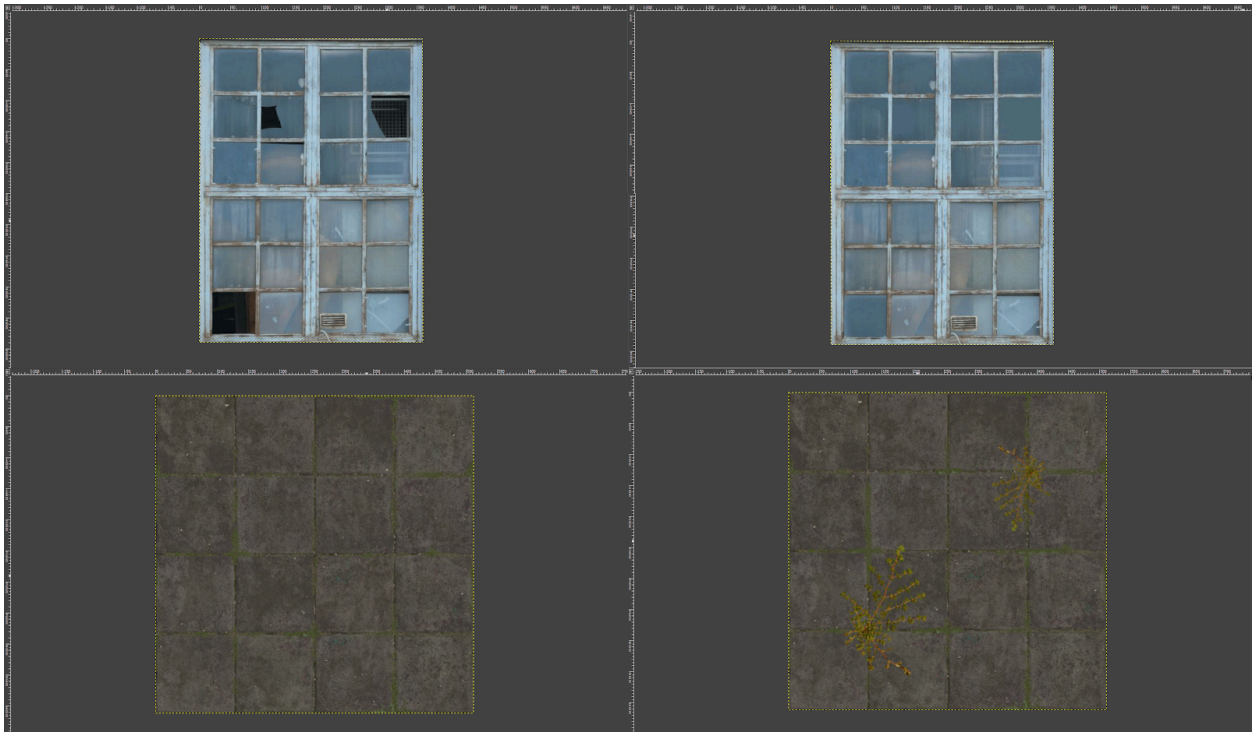

Figure 4. Two textures edited in GIMP - before and after views

The images shown in figure 4 show the original and edited versions of two different textures that were used in the game. These textures were edited in GIMP to further show the effects of time on the abandoned surfaces. The first texture is of broken and fixed windows, while the second texture is of new and old/overgrown pathway tiles.

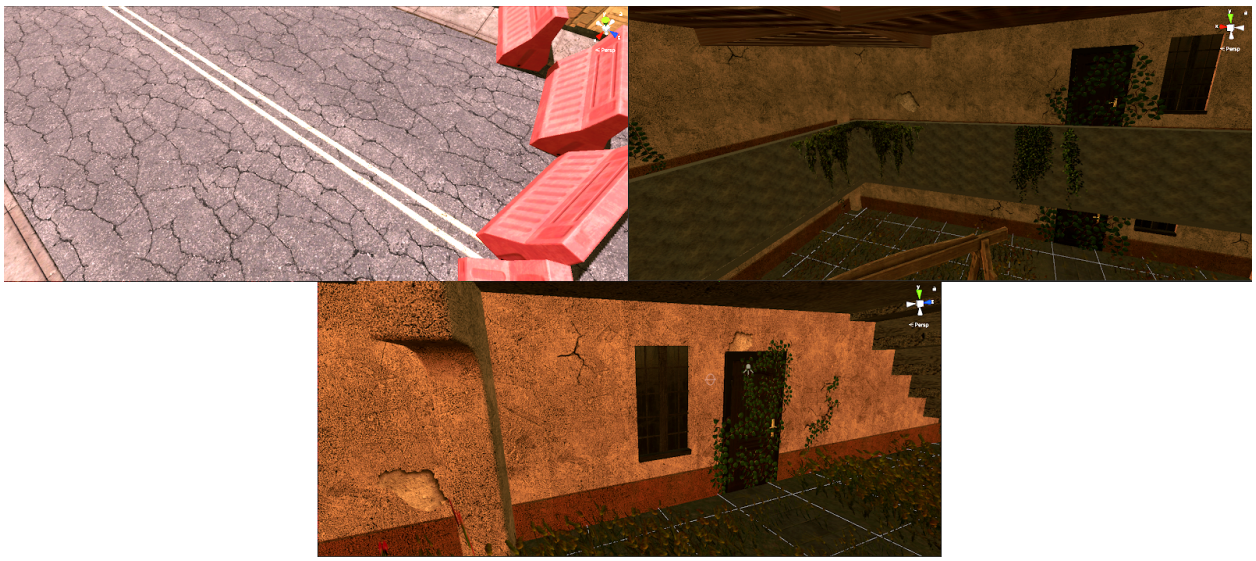

Figure 5. Decals Represented in-engine (road surface marks, hanging vines, wall cracks)

Lastly, the results of the decal system are shown in figure 5. Each kind of decal (i.e. vines, wall chips, etcetera) consists of a very thin cube that has been set up with a material that corresponds

to the decal that needs to be seen. These materials are set to use the decal shader that was created for this technique. As seen above, any png image can be turned into a decal. For best results, everything but the main part of the image was made to be transparent. This decal system easily adds much more age and levels of ruin to any object within Unity without having to edit said object in outside software.

1.1.7 Discussion

After using all three of these techniques to try and age 3D assets, it can be said that the decal system was the most extendable. Any object within the game can be changed at any time by adding a thin cube to layer a decal over the mesh. It was also the only technique that consistently yielded results in a timely manner. Creating a new material that uses a shader graph takes a few minutes whereas editing assets in Blender or textures in GIMP could take quite a while depending on the depth of the changes. One major downside to this decal system is how messy it makes the scene editor in Unity. Multiple instances of the same decal must still be on separate cubes. This leads to having a large amount of decals shown in the editor.

The other two techniques also have their own strengths. Even though it might take longer to edit textures and meshes in external software, it would all be more efficient for the engine in the long run. In a large-scale game, rendering hundreds, possibly even thousands of separate decals in the way they were created for this research can become costly. Creating a handful of materials with edited textures or a few versions of a model with an edited mesh is far less taxing. However, editing meshes in Blender does have one major downside. As described by the creator of One Wheel Studio in one of his tutorial videos, adding or deleting faces on a mesh in Blender can lead to the UVs for that specific object losing their connections with the texture maps (Video tutorial[8]). From prior personal experience, it is very easy for UV unwrapping on a mesh to go wrong once pieces are moved around on a mesh. One must always be wary of this when editing 3D assets for any project, not just one where the assets have to look old and dingy.

1.1.8 Conclusions

Performing this research allowed me to learn that all of the aforementioned software have their own strengths and weaknesses. Their usefulness depends on what the individual project is looking to accomplish. For the case of *Through the Lens,* the decal system worked wonders in helping to achieve an aged look quickly. However, other games may need to make use of the other techniques described to achieve their goals.

If somebody is not familiar with Blender or GIMP, they can always use Maya or Photoshop to achieve the same things. However, during this research it was found that Blender and GIMP can do many of the same things their respective counterparts can do for free. A change that could be made to the methodology could be to add in the editing pipelines for Maya and Photoshop to see if they are any different than Blender and Gimp respectively.

[8] https://youtu.be/PcmQhqZC_Oo?t=116

Time crunches and uncontrollable outside forces stopped this research from going as far as it could. There was certainly much more that could have been done to make the 3D models found in Through the Lens look more aged. It is disappointing that I was not able to do more editing with some of the assets within the game, but what was accomplished was still valuable.

1.1.9 Future Work

The version of Unity's Universal Render Pipeline (URP) that *Through The Lens* is currently using does not have a decal system built in to it. Instead, we use the decal system that was described earlier on in this paper. Something to be done in the future would be to port this project to the newest stable version of Unity that contains a pre-existing decal renderer. According to Unity's documentation, this was introduced in URP 12.0.0 (or Unity version 2021.2.0b14)("Decal Renderer Feature[9]). This way the project could use pre-built technology with more capabilities available to it.

One main technique discussed for creating aged assets was editing existing textures to fit our intended design. Another bit of future work that could be done is creating 3D assets and their textures from scratch to fit the project. I am a very visual person, so sitting down to make something in Blender when I have the time has always been relaxing. Without the looming threat of degree deadlines, creating 3D assets and their textures for this specific project within a software such as Blender would be great practice. It would also make the game less reliant on outside and independent asset sources. Sometimes these independent sources can have problems (such as copyright claims) that pop up at some point down the road. In fact, they can sometimes disappear from the internet altogether. By creating our own assets for this project, we could hopefully preemptively stop any of these issues.

[9] "Decal Renderer Feature: Universal RP: 12.0.0." Unity3D Docs. Unity, n.d. Document Link.