RECONSTRUCTING THE PAST IN REVIT

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INTRODUCTION

In the interior architecture industry, the primary focus of digital software modeling is to display a design for a new construction project. An interactive 3D model serves as a visual representation of an interior architect's vision and proposal for a project. In recent years, a digital software program known as Building Information Modeling (BIM) has also been used to reconstruct and archive lost historic buildings. A notable example of the use of BIM for historic reconstruction is demonstrated after the burning of the Notre Dame Cathedral in Paris in 2019. After this devastating loss of a historical icon, BIM software was used to create a reconstructed 3D model of the cathedral. This model served as an archive of the building as well as a plan for its physical reconstruction (Autodesk, 2020).

The two main approaches for modeling with BIM are the use of interactive 3D laser photo scanning of an existing building and reconstructing a lost building with archival documents. The first method of photo laser scanning automatically measures the three-dimensional coordinates of a given region of an object's surface (Murphy et al., 2009). Notre Dame Cathedral was fortunate enough to have had its interior given a highly detailed laser scanned in 2010 (Autodesk, 2020). This laser scan can be imported into BIM software programs such as Revit and be turned into a reconstruction model.

While laser scanning is an ideal method to begin a BIM reconstruction model, it can have its limitations if the building has already been demolished. In this case, photographs and architectural drawings can be manually interpreted to reconstruct the building using a BIM software. This method was used to reconstruct a model of the Vinohrady Synagogue in Prague, which was demolished in 1951. In this example, the researcher made an interpretive digital model by comparing and analyzing tiny details of limited photographs and drawings.

STUDY GOAL

This research study utilizes Autodesk's Revit software to reconstruct a lost historic building with limited archival materials. Reconstructing a lost heritage site as a digital model has the power to be recognized by people around the world without the need for it to be physically constructed.

HISTORICAL CONTEXT

The building chosen for this project was an indoor pool of Grossinger's Catskill Resort Hotel in Liberty, NY. Grossinger's was one of the hundreds of resorts that made up the NY Catskill Mountain resort region from the 1920s to the 1990s (Brown, 1998). Known as the Borscht Belt, these resorts originally catered to a predominantly Jewish clientele and became as the birthplace of stand-up comedy (Brown, 1998). Grossinger's was the most prominent resort of the Borscht Belt and was notable for its Mid-Century Modern styled buildings, specifically the indoor pool.

Constructed in 1958, the indoor pool building represented the epitome of the Borscht Belt in the 1950s-style: extravagance, luxury, modernism, and celebrity. (Padluck, 2013). Covered in floor-to-ceiling glass windows that provided sweeping views of mountainous surroundings, the landscape played an important role in the space's design concept (Padluck, 2013). The building also featured massive laminated beams that supported a wood and glass patterned atrium above the Olympic-sized swimming pool. Since the building was constructed during the beginnings of the space race, huge sputnik chandeliers were hung above the pool deck to create a cosmic atmosphere for swimmers (Padluck, 2013). The resort closed in 1986 and after 32 years of abandonment, the resort and the indoor pool building were tragically leveled.
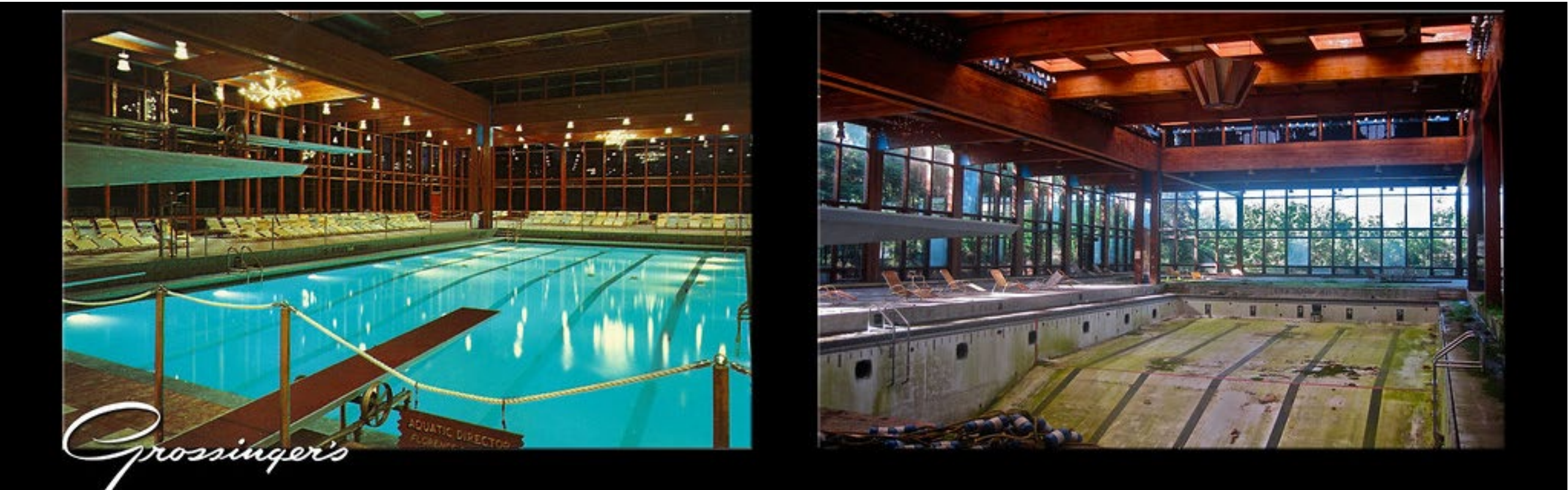
Before and after images of Grossinger's Indoor Pool from 1958 to 2010. Courtesy of Ross Padluck (2013)
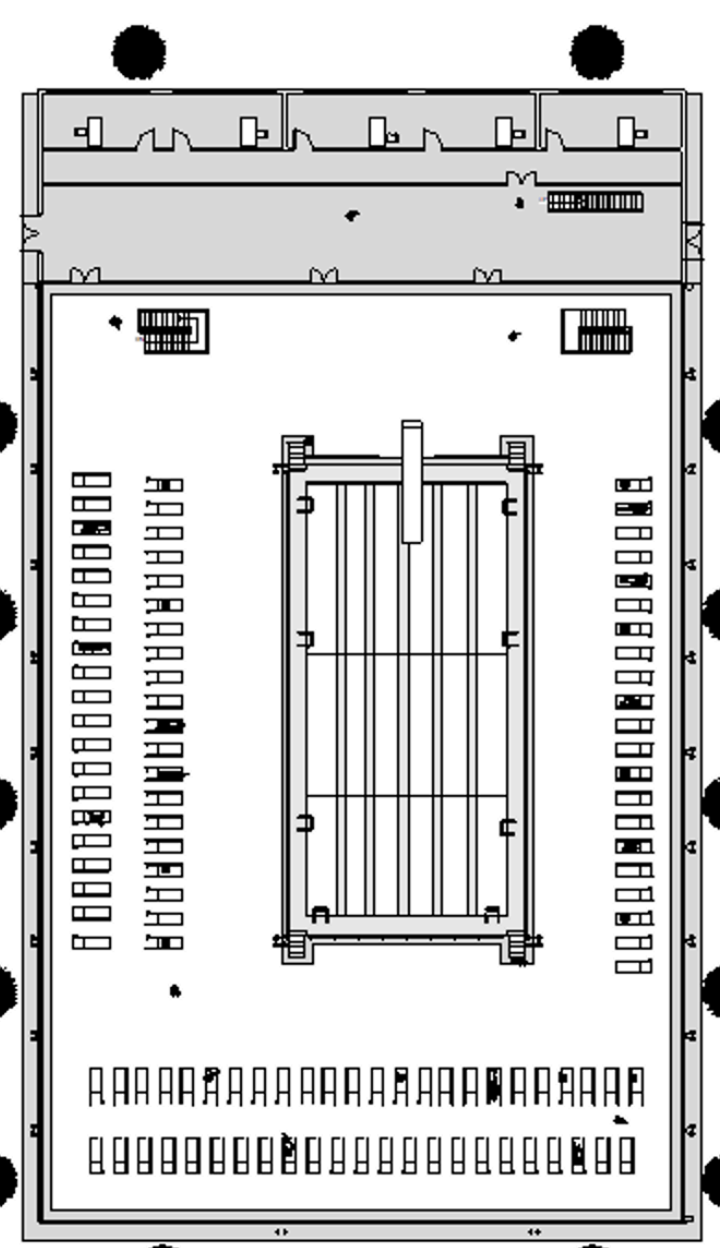
METHODS

The methods used for digitally recreating a demolished historical building follow similar steps as those used for new construction. These steps begin with tracing a scaled floor plan to create the outline of the building and architectural drawings to construct the floor and ceiling.

According to a research study conducted on the recreation of a synagogue in Prague that was demolished in 1951, the first crucial step for a recreation project is to organize all the archival materials for reference (Boeykens et al., 2012). The limited nature of the archival documents for the building proved to be a major challenge. The documents for the indoor pool consisted of a scaled floor plan courtesy of Ross Padluck (2013), less than ten vintage postcards, and hundreds of photographs when the building was abandoned.

The key to modeling in BIM software is to precisely and accurately measure every architectural element to ensure its accurate depiction. Due to the limited documentation of the indoor pool, many measurements had to be estimated. Hours were spent carefully analyzing images of the space to approximate the measurements for the building's every detail. Many elements, such as the geometric ceiling above the pool, were very difficult to construct without existing drawings and instead required the analysis of photographs depicting many different angles of the ceiling. At first glance, the coffered ceiling appears to be composed of a series of four-foot squares above five horizontal beams. However, after consulting images of other angles, it appears that additional rectangles divide the coffered sections into quadrants of three rows.

Another challenge arose when renovation and alterations were discovered after comparing the original photographs with the dilapidated images. Vintage photographs of the building depict a unique structural support system of cantilever beams and support columns on the exterior of the building. However, these support systems are missing in the photographs of the building in an abandoned state. In addition, it appeared that at some point some of the skylights above the pool were removed and replaced with wooden panels. Both instances highlight the importance of careful comparison of archival material to achieve the most accurate results.

Following the construction of structural systems, the crucial final step of the process is to incorporate the materials and furniture into the model. Revit allows for finishes to be created using physical images of materials. Once again, the limited documents hindered an accurate representation of the materials as there were no close-up photographs of the tile and flooring materials that could be used as a textured surface in Revit. Instead, Adobe Photoshop was used to extract the Red Green Blue (RGB) color model numbers for an accurate representation of a material's hue. These numbers can be imported into Revit to create a reproduction of the material.

In creating furnishings for the model, the most common approach is to use downloadable furniture models known as families. Families can be edited to adhere to the requirements of the project such as using the desired finishes. While it is possible to create custom furnishings and objects in the model, the exact measurements are required to create an accurate depiction.

First Floor Plan

Exterior Rendering

CONCLUSION

This project enlightened my passion for historic preservation by showing me the wide variety of methods used to reconstruct a historic building using architectural software. The method I selected for this project of replicating a building using limited materials proved to be a welcomed challenge. I am very proud of my result of being able to model and archive a lost underrecognized historic building from the previous century. The indoor pool at Grossinger's resort was a building that has been near and dear to my heart since I discovered it in a dilapidated state over ten years ago. Behind the decay from years of abandonment, I could see the architectural grandeur of the building's past.

While conducting this research study, I have been so humbled to be able to digitally reconstruct this incredible historic building using the powerful Revit software. Despite the obstacles set by the limited materials, I am very pleased to be able to commemorate the memory of the building with an interactive three-dimensional model. This project has revealed the potential of using BIM modeling to digitally archive historic buildings as well as potentially help reconstruct lost buildings such as this in the future.

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