Living Off The Grid: Preconstruction Process

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This project-based senior project is the design and preconstruction work needed to complete the build-out of the interior of a van in order to become a livable space. This project includes a 3D model of the vans designed interior, a developed estimate approximating the project cost, and a tentative schedule for the construction. This project was created to provide others with the information needed to identify how it is possible to live off the grid and what the initial upfront costs may be. Ultimately, this project should serve as a case study to assist others who are interested in potentially pursuing a life off the grid by building out a livable space in a van.

Keywords: preconstruction, building information modeling (BIM), construction estimating, construction scheduling

Introduction

With today's social media presence, information and trends spread like wildfire. One of the more recent, an ecologically sound trend; living off the grid – particularly in a van as a means for mobility, referred to as van life. Diving into this topic, I planned to design and carry out the preconstruction process of the build-out of the interior of a van. This space typically includes; a bed, a kitchenette, precisely placed water/propane/electrical systems, and storage space to utilize the small spaces in between. The idea of taking a van and making the cargo space an inhabitable space is a far off dream for many outdoor enthusiasts, but many feel daunted by the task at hand and overwhelmed by where to start on such a project. Van life seems appealing because of the accessibility to the outdoors, ability to live off the grid, and cheap cost of living. The purpose of this process is to figure out how costly and time consuming it would be to enter this realm of living (i.e. van purchase cost, cost of build-out, etc.).

Background

While traveling to local climbing areas throughout California, I have been exposed to many individuals who have chosen to pursue van life full-time. Not knowing what it takes to attain this lifestyle (or hobby), I wanted to research to see how feasible this might be. Additionally, I hope that the deliverables I generate are easy to follow so that other students or individuals who are interested in building their own van may be able to do so following the information I have generated.

Process

The preconstruction process consisted of three major components; the design of the space, the estimate, and the preliminary construction schedule. The components are outlined below and final deliverables can be reference in exhibit A.

Research

Before diving into designing the space, I had to figure out which space would be best for me. I looked into many different types of makes and models of vans, I decided to work with a 2011 Mercedes 2500 Sprinter. This option was well priced and offered a cargo area that I could see myself utilizing well. As a person of shorter stature, this option would allow me to stand up and have a decent amount of workspace depending on the potential design.

Design

Once I decided on the make and model of the van, I had to find out the dimensions of the cargo space so I knew how much space I would have to work with. Once I found the dimensions, I started to tinker with the design on Sketchup. First step, was putting together a list of what was needed in the space, the big item I did not want to include was a bathroom. Second, I knew it would be best to create a platform bed for maximum utilization of space. Finally, I established where casework would go, how I would like the kitchen to be laid out, and where my water and propane systems would reside.

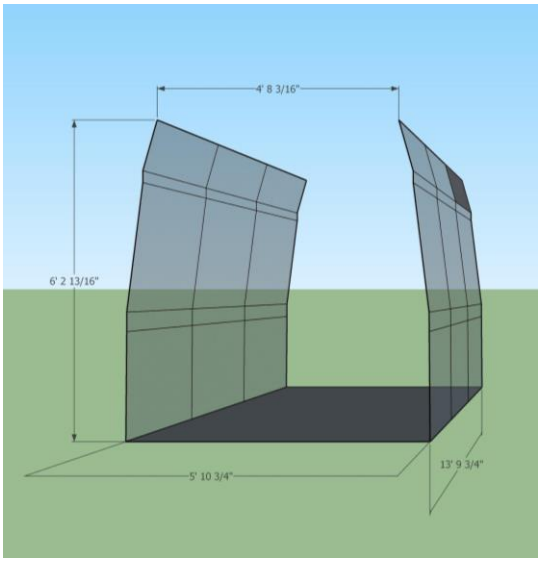

Figure 1: Dimensions of livable cargo space within Sketchup.

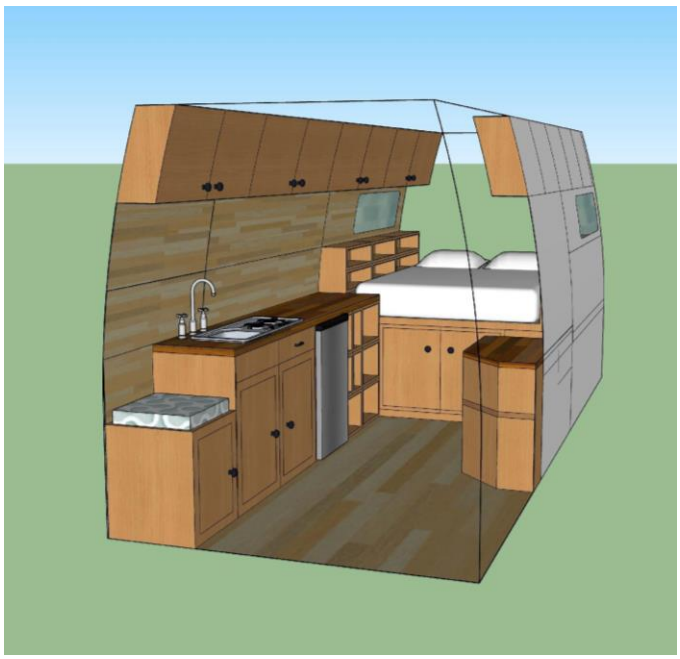

Figure 2: Final design.

Estimate

Once the design was complete, I was able to hide objects in my 3D model to obtain certain views, which I then exported to a PDF. The information that was now in a PDF format was then documented to establish to perform takeoffs. The information from the takeoffs was compiled to create my estimate. The estimate included the cost of

the van with van upgrades (tire upgrade, swivel seats, van awning, solar panels), the materials needed, and this was under the assumption that all work was to be self-performed. You can reference the completed takeoff in exhibit A. Using the standard CSI format, the estimate details scope of work, as well as the costs for Material, Labor, and Equipment.

Schedule

Once the design and estimate was complete, I started to plan how I would carry the project out. First up was conditioning the space and installing a floor. Casework, which included the platform bed, storage spaces, and cabinets, were the first items to be assembled outside of the van. After the casework was constructed and installed I could then start on the wiring and runs for my three major systems, electrical, water, and propane. This information is further explained in the deliverables section of the final binder.

Deliverables

The final deliverables include; a full BIM design of the space, a complete construction estimate detailing materials needed for each portion of the project, and a construction schedule totaling the amount of days needed to execute this type of project.

These deliverables allowed me to utilize software's I have been using throughout my college career in a real-life scenario. For the design I used Sketchup and exported to .skp file. For the estimate I used BlueBeam and Excel and exported as an .xsl file. For the schedule I used Microsoft Project, which was nicely compatible with Excel, and exported as an .mpp file.

New Knowledge and Lessons Learned

The largest takeaway from this project is to be open to new ideas and processes. For example, when presenting this idea, I wanted to complete the construction in an extremely limited amount of time with no secured funding. I was met with skepticism and looking back I am so glad I listened to those individuals who urged me to assess and study the preconstruction process instead.

Upon starting the design, I jumped into modeling in ArchiCAD – software I am very familiar with. After establishing parts of my design, I was urged to try and design in Sketchup. After debating whether or not to start all over in a new program, I decided I should venture out of my comfort zone and explore the new software. In doing so, I now have a better understanding of Sketchup which is compatibility with other programs within the Trimble realm.

Lastly, I learned that van life has a large upfront cost but is no more expensive than a brand new SUV. The final estimate I generated was a bit over $34,000 and the schedule yielded 79, 8-hour working days. All in all, this project has provided me with the ability to explore my skills and how the evolution of a project may develop. With the information I gathered, along with the help and advice of those who helped guide me along the process, I feel that I was able to design and develop a complete project that can be utilized by others, and myself in the near future. .