

THE ARCHITECTURAL CHUCK BOX

by

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Master

in

Architecture

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.



Figure 1: Process | Aerial Photograph, towing the Chuck Box down a backroad

ABSTRACT

The thesis investigates the way we live and travel *overland* in rural Canada. It explores the typology of the camp combined with the mobility of a trailer as a source for surveying temporary, outdoor dwelling, and the activities this mode of building supports. Recorded throughout the thesis is the design and construction of my own off-grid overland trailer named the *Chuck Box*. The work was completed using various tools and techniques which has been documented and presented on YouTube. The study focuses on outdoor activities with an emphasis on self-resiliency, connection to nature, and light-touch-down architectures as a means to be respectful in the Canadian wilderness. The *Chuck Box* aims to bridge the valuable experiences of roughing it in the back country with some of the modern-day comforts people have grown accustomed to even when living outdoors.

ACKNOWLEDGEMENTS

It is difficult to fully acknowledge the number of individuals who have contributed to the production of this book. The conversations and exchanges I have had with professors, work colleagues, store owners, online forums, and individuals of my community is what propelled this thesis forward.

I would like to formally say thank you to my thesis advisor, Johan Voordouw for his insightful wisdom and comments. His positivity is what made completing a thesis online possible.

Thank you to Marianne and Ken Wolfe for gracefully lending me their workshop space to complete my project.

To say thank you to Ian Hill does not suffice. Your constant engagement and mentorship not only pushed me throughout my architectural education but also fueled my passion for design and the outdoors. I am looking forward to many kilometers of paddling this beautiful country.

My gratitude to my friends and family who supported me through thick and thin. To my mother, Coretta Tremblay for all the sacrifices you have taken so that I can pursue my passions. I am grateful for your unwavering support and encouragement throughout my academic journey.

To the person that has been by my side since the beginning, my wife, Jessica Tremblay. I cannot express how grateful I am for your patience, support, and encouragement every step of the way. Thank you.

Finally, I would like to dedicate this book to my father, Errold Tremblay. He was a man of integrity who taught me to always do the right thing even if there is no one watching. I will always give my 110%.

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Figure 2: Context | On the road, Ontario Highway 11 North

PREFACE

I am trying to organize my thesis and formulate a story. My to do list is endless and the content that I have created is vast. The collection ranges from different types of media, all their own respective format and investigations. The origins of this work may be linked to an initial interest in outdoor activities paired with a desire to build something real. A full-scale architectural project.

In the first part of this book, I explore and research rural Canadian landscapes and the history of camping. Since my youth, I have learned how to plan outdoor adventures and outline the necessary equipment to successfully overland in the backcountry. As part of this thesis, I have familiarized myself with prominent outdoor enthusiasts and writers, collecting insightful techniques and words of wisdom along the way. In the second part, I developed techniques in fabrication and produced a full-scale architectural object to facilitate these outdoor adventures. To ensure indoor comfort, the trailer was designed with tight architectural detailing, an independent heating source, and a complete off grid solar system. The entire build process was diligently recorded, edited, and assembled into a video series posted on YouTube. This series is organized in chronological order by the sequence of tasks I carried out to complete the construction. In the third part, I present a manifesto and post occupancy reflection after having tested my project. In this part I discuss the successes and shortfalls of the project as well as the lessons learned. In conclusion, I bring the trailer camping for the first time and discuss what this all means for me moving forward.

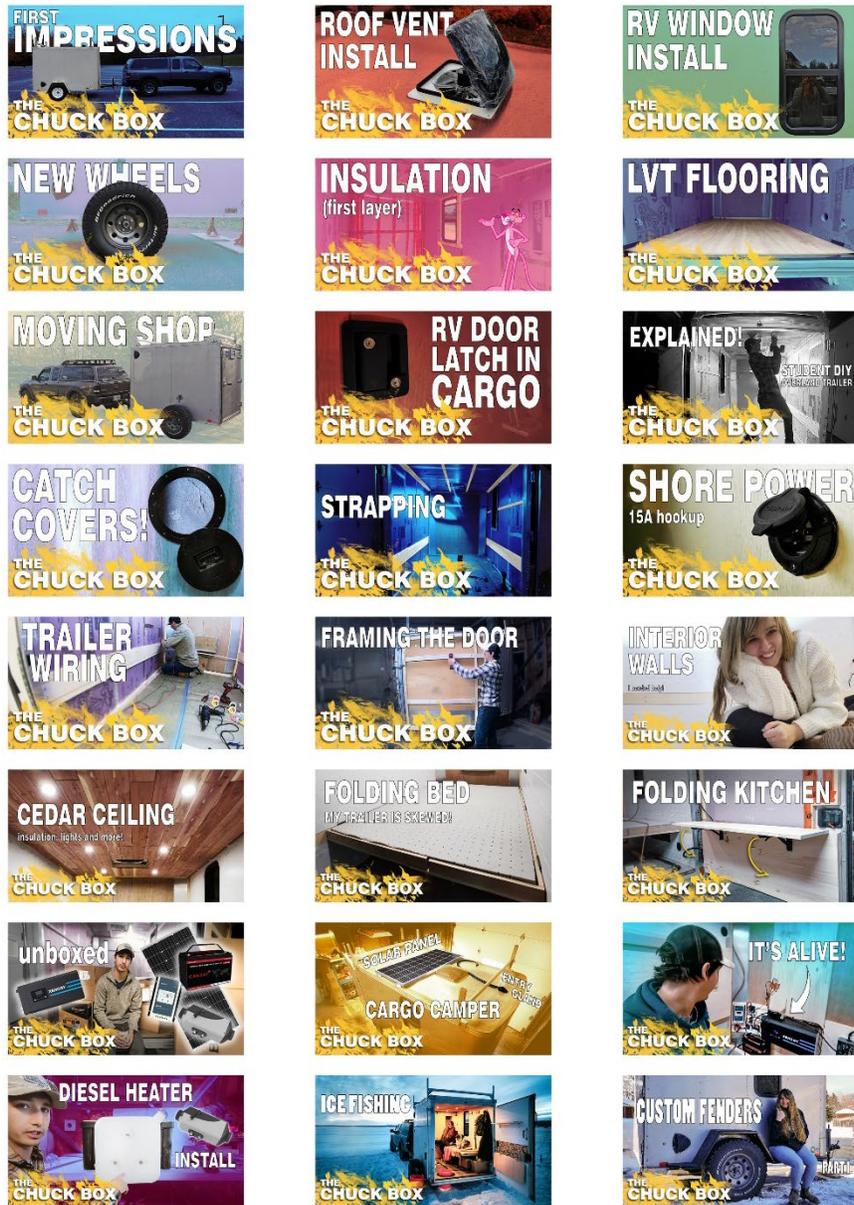


Figure 3: Process | YouTube video playlist

This book is an assembly of parts; a collection of research, personal reflections, and a documented process of my own design-build journey. The book is modular in the sense that it can be read as a whole, in parts or cherry picked based on the reader's preference.

YouTube Channel:

Joel Tremblay



The video playlist can be viewed at:

<https://www.youtube.com/channel/UCrFTv5TYA49U23uX-XjKM7g>

PART 1: THE CONTEMPORARY RURAL CANADIAN LANDSCAPE

The following outlines current conditions of the rural Canadian landscape, providing context and terminology for the design of an off-grid overland trailer.



Figure 5: Context | Campbell Folding Camping Trailer - 1914



Figure 4: Context | Turtleback Trailers Expedition Series - 2019

To first understand the contemporary mobile landscape, it is important to consider its history, culture, and evolution. Humans were nomads for thousands of years, traveling and living with only the necessities to survive. The movement of our ancestors were influenced by the changing of seasons, migrations of animals, and growth cycle of plants.¹ The architectural typology of nomadism is historically recognized as a hut, tipi, yurt, or tent. These types of shelters can be transported, assembled, expanded, and stored. The typology requires a set of skills and experience necessary to set up shelter adjusted to our needs and conditions. It can be said that these shelters were the first form of mobile architecture.² Yuval Noah Harari in *Sapiens, a brief history of humankind* writes that “the average forager had wider, deeper, and more varied knowledge of her immediate surroundings than most of her modern descendants. Although, the human collective knows far more today than did the ancient bands, at the individual level, ancient foragers were the most knowledgeable and skillful people in history.”³ At some point we settled and gathered but the desire to move around never faded. The idea of travel slowly shifted from a standpoint of survival to one of exploration and eventually recreation.

Camping for recreation gained particular traction in 1869 when William H.H. Murray published the guide: *Adventures in the Wilderness; Or, Camp-Life in the Adirondacks*.⁴ Murray’s camping literature emphasized the refreshing qualities that one can experience when “roughing it” in the wilderness. Shortly after, in 1874 a book called *Popular Resorts and How to Reach Them* by John B. Bachelder coined three modes of camping:

CHUCK BOX - CAMP KITCHEN



A place for everything and everything in its place.

MOBILE ARCHITECTURE



Architecture on the move!

Figure 6: Context | Chuck Box Comparison to Mobile Architecture

1. On foot (what we call “backpacking”); 2. On horseback, which allowed for more gear and supplies; 3. With a horse and wagon. This last was most convenient, allowing for the inclusion of more gear and supplies as well as campers who were unprepared for the rigors of the other two modes. However, horse-and-wagon camping was also the most costly and geographically limited because of the era’s poor roads.⁵

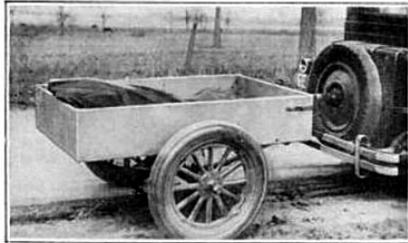
- John B. Bachelder

Since the horse-and-buggy there has been a desire to outfit oneself with tools and equipment to make life more comfortable while on the road. The *Chuckwagon* can be recognized as one of the earliest types of mobile field kitchens, historically used for the storage and transportation of food and cooking equipment on the prairies of the United States and Canada.⁶ The smaller counterpart to the chuckwagon is the *chuck box*. This device is used by campers for storing many items typically associated with a camp kitchen. These boxes are commonly custom built by campers to suit their personal equipment checklist and camping style.⁷

With the rise in automobile use came the activity of auto-touring and the development of the *touring car*. A touring car is an automobile suitable for distance driving.⁸ The activity of auto-touring necessitated the ability to transform the vehicle into a shelter while on the road. The auto-trailer, being an extension to the touring car, evolved into what is formally known as the auto-camping trailer. Auto camping has remained a popular activity to this day as a cost-effective alternative to staying in lodges or hotels while traveling.

Auto-Camping Trailer Built for Less Than \$25

By HALVOR ANDERSON



The empty trailer weighs 200 lb. and is attached by means of a universal coupling, which is bolted to the spare wheel carrier.

DOES it pay to build your own trailer? That is the question I asked myself—and the answer is the trailer illustrated, which cost \$23.30. My object was to build it both substantially and economically. The angle iron for the framework and the curved brace on the front were obtained from an old iron cot. An old Ford front axle was bought for 50 cents and two Ford springs for \$1 each. Shackles and other parts cost \$2.60, machine parts \$2, tubing 50 cents, bolts 50 cents, lumber \$2.70, wheels \$3, and welding \$9.50.

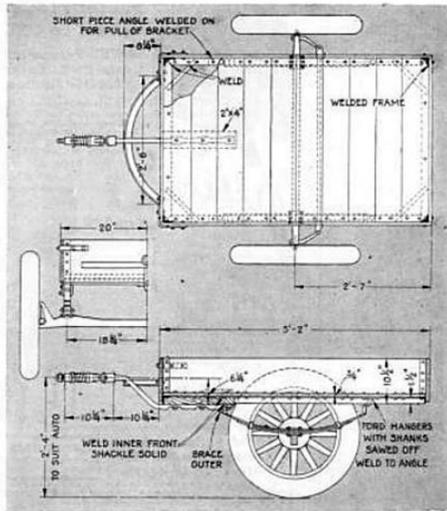
As shown in the drawings, $\frac{3}{8}$ by 3 by 3 in. steel plates were welded on the axle

to serve as spring pads on which to fasten the springs. The Ford front spring hangers were welded in position on the angle-iron frame after their shanks had been sawed off. The front shackle was welded solid and a brace added on the outer edge of the spring. The rear shackle floats.

The flooring and sides were fastened by means of $\frac{3}{16}$ -in. bolts with lock washers. A piece 2 by 4 by 17 in. was attached to the bottom as shown to allow the 1-in. steel tubing to be secured firmly. This tubing was an old tie-rod from a junked car. Ordinary pipe would not do because the seam would open up when forging this part to shape.

As I had the use of a lathe and drill press in a garage, I made the universal puller, thus saving the cost of a commercial puller. The advantage of this type of puller is that the spring tension reduces the road shocks when the trailer rides over bumps.

After the trailer was assembled, a 1-in. hole was drilled in the spare wheel carrier at the back of the automobile to allow the end of the puller to pass through and be secured by means of a single nut and lock washer. As an additional precaution, however, a $\frac{3}{16}$ -in. cable was added as a safety puller. It was looped around the front brace of the trailer and then bolted to one of the studs used for holding the spare wheel in place. If a



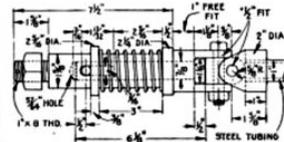
Assembled views of the trailer showing the chief points of the construction. Ford wheels, springs, shackles, and front axle were used.

Continued....

AUGUST, 1930

POPULAR SCIENCE MONTHLY

spring snubber is wanted, an old inner tube can be passed around the axle and bolted to the floor of the trailer. The trailer weighs 200 lb. empty and has undergone severe and extensive tests loaded with sandbags weighing 500 lb.



Working drawing of a universal spring puller which can be made in the lathe and drill press.

Materials for Trailer

No. Req.	Materials and Use	Dimensions
1	Ford front axle	
2	Ford springs	
4	Ford shackles	
4	Shackle hangers	
2	Ford wheels	
8	Lag bolts for springs	$\frac{3}{8}$ by $2\frac{1}{2}$
3	Lag carriage bolts in floor	$\frac{3}{8}$ by 4
10	Carriage bolts for brackets	$\frac{1}{2}$ by $1\frac{1}{2}$
7	doz. Lag carriage bolts for boards	$\frac{3}{8}$ by $1\frac{1}{2}$
2	Angle irons $60\frac{1}{4}$ in. long for sides	$\frac{3}{8}$ by $1\frac{1}{2}$ by $1\frac{1}{2}$
2	Angle irons $38\frac{1}{4}$ in. long for ends	$\frac{3}{8}$ by $1\frac{1}{2}$ by $1\frac{1}{2}$
4	Angle irons $10\frac{1}{2}$ in. long for corners	$\frac{3}{8}$ by $1\frac{1}{2}$ by $1\frac{1}{2}$
2	Angle irons 6 in. long for spring	$\frac{3}{8}$ by $1\frac{1}{2}$ by $1\frac{1}{2}$
2	Steel for front end spring braces	$\frac{1}{4}$ by 1 by 7
2	Boards for sides	1 by 12 by 62
2	Boards for ends	1 by 12 by $38\frac{1}{2}$
11	Matched boards for floor	1 by 6 by $33\frac{1}{4}$
1	Matched board for floor	1 by 4 by $33\frac{1}{4}$
1	Board for puller base	2 by 4 by 17
2	Steel for front corner brackets	$\frac{3}{8}$ by 1 by 7
2	Steel welded on axle for springs	$\frac{3}{8}$ by 3 by 3
4	Steel for securing springs	$\frac{3}{8}$ by 1 by 3
1	Steel tubing for puller	1 by 30
1	Universal puller	

NOTE: All dimensions are in inches.

Figure 7: Context | Joel Silvey, Auto-Camping trailer article - 1930

As the number of automobile owners increased so did the popularity of auto touring, as camping or traveling was often referred to. There were three common methods of auto touring prior to the tent trailer. First was sleeping inside your auto with special rigging as seen in this early advertisement by Tentobed Company. Second was the auto tent and bed kit that was usually carried on the running board. The kit setup like a tent but was attached to the auto using it both for support and additional room. The third method was the auto trailer. By 1912 it was becoming common to see people towing their camping outfits (tents, gear, etc) in an auto trailer, especially in the western states. All three methods remained very popular for many years after the invention of the tent trailer.⁹

– Joel Silvey, Pop-up Camper History

Even though the technology and methods of the camping industry have come a long way since its conception, the core promises that the activity has to offer remain the same. Auto Trailers quickly became an extension to the automobile and fell into the world of mass-production. Over the years, trailers have become categorized, where a type, weight, and model serve a specific purpose. Heavy hauling, utility and recreational trailers define these main categories. While recreational camping trailers have become known as the primary mobile shelter, trailers from other categories have often been converted to serve the same purpose. The concept of mobile architecture grew from traditional vernacular tents to modern travel trailers, high tech caravans, converted cargo trailers, self-built ice shacks, and extravagant tiny homes. Although mobile architecture varies in type, form, and program, they all suggest the latent promise of freedom from everyday routines and obligations.¹⁰



Figure 8: Context | Tin Can Tourists at De Soto Park - 1920

The increased popularity of camping induced a new strain on the landscape. Like all newfound activities, there were people who acted responsibly and those who took advantage of this freedom, remaining ignorant to their actions. People would camp wherever they wanted leaving a trail of destruction as they moved from place to place. To protect the reputation of campers and commit to more defined conservation efforts, outdoor groups, regulations, permits, and land-use boundaries were founded to help regulate this newfound freedom. The Tin Can Tourist group, one of the earliest clubs, was established in 1919. The group was organized with three principles; to unite fraternally all auto campers, to provide clean and wholesome entertainment at all meetings, and to spread the gospel of cleanliness in all camps and to help enforce the rules governing all public campgrounds.¹¹ Today, there exists hundreds and thousands of outdoor groups, all of which share similar principles regarding community and conservation. There are groups that focus on just about any type of outdoor activity. This thesis will focus on the niche that is overlanding and backcountry camping.

Camping in Canada can be broken into two main categories: 1) the formal – known as front country camping,¹² where people pay and reserve a maintained campsite at a public or private park or 2) the informal - *Overlanding* in the back country or on crown land where there is minimal to no supporting infrastructure and operates on a first come, first served basis. Of course, the second form of camping requires more experience and equipment, but both allow people to reconnect with nature and promise the freedom of everyday monotony. Mobile architecture and my own overland trailer have the ability to move between these two conditions.

Overlanding is about exploration and adventure travel. While the roads and trails we travel might be rough or technically challenging, they are the means to an end, not the goal itself. The pursuit is to see and learn about our world, whether on a weekend trip 100 miles from home or a 10,000-mile expedition across another continent. The vehicle and equipment can be simple or extravagant – they, too, are simply means to an end. History, wildlife, culture, scenery, self-sufficiency – these are the rewards of overlanding.¹³

– *Overland Journal*

Ontario's Crown land represents 87% of the province by area; more than 95% of northern Ontario is Crown / Public Land.¹⁴ With all of this land as our backyard, venturing out into the wilderness is a common practice. The activities that we practice outdoors are more than just recreation and leisure. They are a chance to reconnect with nature, to establish a ritual with the wilderness, and continue long family traditions that have been engrained into the culture for outdoor enthusiasts. This connection with the wilderness is about presentness with the landscape. The immediate context radiates within you and it is up to you to decide what to do with that energy.¹⁵

Outdoor enthusiasts seeking adventures in the hinterland require special equipment and experience. The equipment and experience needed is influenced by the ambitions of the enthusiast and pursuits to be undertaken. It is a linear graph. The more extreme you go, the more prepared you need to be. Typically, but not exclusively, the first requirement to reliably travel outback is a capable off-road vehicle¹⁶. Beyond that, common vehicle modifications include suspension and wheel upgrades to increase ground clearance, travel distance, articulation, and traction. Knowledge of the working parts of the vehicle are also necessary to troubleshoot any problems that occur on the trail. Maps, GPS, SOS devices, knowledge of the landscape and navigation are essential. Survival techniques and tools are also a part of the arsenal for an overlander. Venturing out into the remote wilderness can be a simultaneously terrifying and rewarding experience. This form of travel is off road and off grid; it requires redundancies and back up plans. Living remotely necessitates a respect for the surrounding landscape and wildlife. These concepts, differences and relationships constitute the practice that is commonly referred to as overlanding.

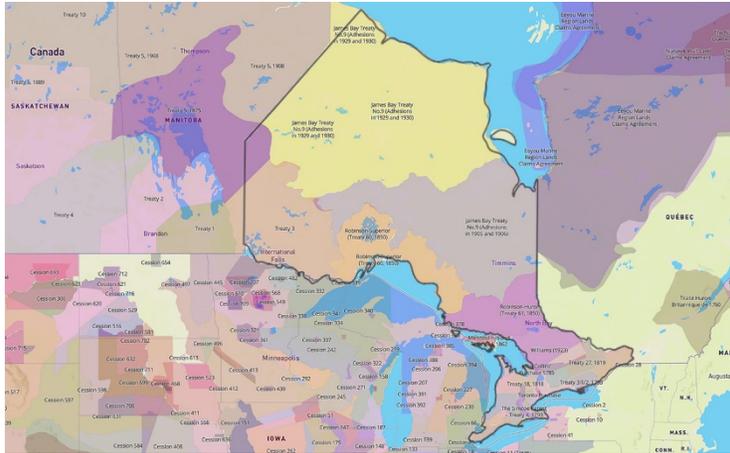


Figure 10: Context | Indigenous Treaties Map

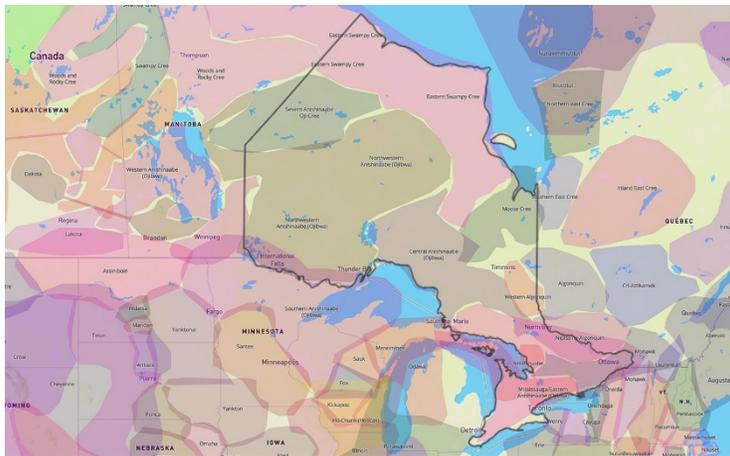


Figure 9: Context | Indigenous Languages Map

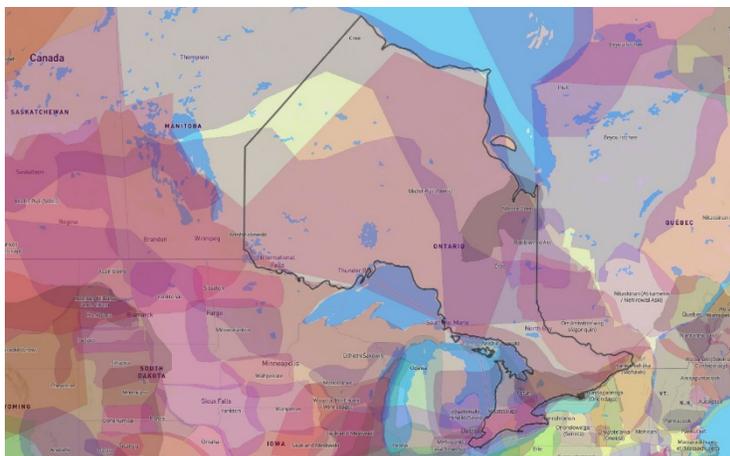
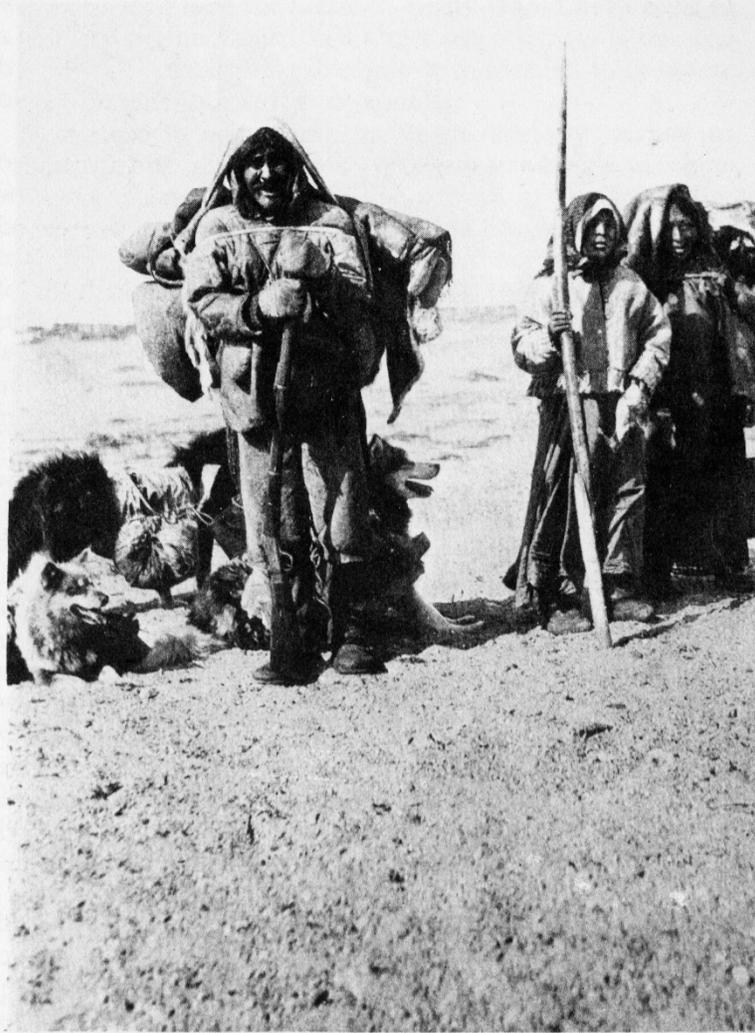


Figure 11: Context | Indigenous Territories Map

The thesis acknowledges that there are contestations with regards to land-use, land-rights, and recreational activities given the complex and fraught history of colonialism in Canada. Crown Land represents more than 39 million hectares of land and water.¹⁷ This is an area where Canadian Citizens can partake in outdoor recreational activities such as camping for free up to 21 days on any given site. Federal land is managed by the Ministry of Natural Resources and Forestry. It is important to recognize that this land was not always governed in such a way. Forty-six treaties, some dating back to the 18th century, make up what is now considered the province of Ontario. A treaty is a legally binding agreement between nations. Agreements between European colonizers and the Indigenous Peoples occupying the land often set out rules of governance, land use, and the relationship between parties. There is dispute around the intention of historical treaties and questions whether land was purposefully surrendered.¹⁸ Kelly Riley, the director of treaty, lands, and environment for the Chippewas of the Thames First Nation stated during an interview with CBC News in 2019 that “I can’t with any real confidence, say that 200 years ago, the people who were here had the world view that would include lines on the ground...My ancestors may have sold this land to the Crown for settlement, but it may not mean that we’ve given up our responsibility towards the land.”¹⁹ A great resource to learn about indigenous land is the interactive maps created by Victor Temprano which tell the story of the land and history through fluid overlapping graphics.²⁰

I recognize the tremendous privilege it is to be able to move freely in the beautiful outdoors. It is with this sensibility and respect that I write this thesis.



Overland travel in summer. Note the packs and dogs and muzzle-loading trade-gun.

Figure 12: Context | Overland travel, Grey Owl - *Men of the Last Frontier*

Overlanding is more than an activity; it is a way of life that encompasses different traditions and cultures. It focuses on the journey rather than the destination. It is an opportunity for people to learn about the history, culture, and landscape upon which they travel. Overlanding has existed for over a century, first appearing in Australia by moving livestock, and then evolving to commercially available tours spanning Europe to Cape Town in South Africa.²¹ Overlanding in North America is gaining popularity because it is a fusion between the vehicle and off roading as well as recognized as roughing it in the wilderness while living in relative comfort.

Overlanding can be done solo or in groups. It can span over a course of a couple days to months or years. Taking part in overlanding can overlap the changing of seasons and different activities that accompany it. The gear, equipment and vehicles have the ability to move seamlessly between the formal (front country) and informal (back country).

This thesis will explore what it means to overland *architecturally*. In other words: how can architecture overland? Originally, camping was about getting out. Unfortunately, we developed an unhealthy dependence on the conveniences found on-grid, taking away from the experience and relationship with nature. Recreational vehicles evolved to be expensive, large, inefficient, flimsy, and dependent on established infrastructure. Overlanding offers an alternative, breaking free from the bounds of settlement and instead relying on mobile self-resiliency. Can architecture be light, respectful of the land, and self-reliant while on the move?

NOTES

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- ¹ Harari, Y., 2019. *Sapiens*. London: Vintage.
- ² Roke, R., 2017. *Mobitecture*. London: Phaidon Press Limited
- ³ Harari, Y., 2019. *Sapiens*. London: Vintage.
- ⁴ Young, T., 2018. *A Brief History Of The RV*. [online] Smithsonian Magazine. Available at:
<<https://www.smithsonianmag.com/innovation/brief-history-rv-180970195/>> [Accessed 30 December 2020].
- ⁵ Ibid.
- ⁶ Smith, S., 2020. *Cowboy Cooking - American Profile*. [online] Web.archive.org. Available at:
<<https://web.archive.org/web/20090708090334/http://www.americaprofile.com/article/5321.html>> [Accessed 28 December 2020].
- ⁷ Wikipedia contributors, "Chuck box," *Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/w/index.php?title=Chuck_box&oldid=957798037 (accessed March 17, 2021).
- ⁸ Merriam-webster.com. 2020. *Definition Of TOURING CAR*. [online] Available at: <<https://www.merriam-webster.com/dictionary/touring%20car>> [Accessed 28 December 2020].
- ⁹ Silvey, J., 2009. *Pop-Up Camper History*. [online] Popupcamperhistory.com. Available at:
<<http://www.popupcamperhistory.com/history1.php>> [Accessed 28 December 2020].
- ¹⁰ Roke, R., 2017. *Mobitecture*. London: Phaidon Press Limited, p.006.
- ¹¹ Ibid.
- ¹² Pc.gc.ca. 2021. *Parks Canada campgrounds*. [online] Available at:
<<https://www.pc.gc.ca/en/serapprocher-connect/ltc-dlc/campement-campgrounds>> [Accessed 22 March 2021].
- ¹³ Brady, S. and Scott, M., 2020. *What Is Overlanding :: Overland Journal*. [online] Overlandjournal.com. Available at:
<<https://overlandjournal.com/what-is-overlanding/>> [Accessed 4 January 2021].
- ¹⁴ Ontario.ca. 2015. *Crown Land*. [online] Available at:
<<https://www.ontario.ca/page/crown-land>> [Accessed 4 January 2021].
- ¹⁵ Thoreau, Henry David, 1817-1862. 1948. *Walden: Or, Life in the Woods. On the Duty of Civil Disobedience*. New York: Rinehart.

¹⁶ Wikipedia contributors, "Overlanding," *Wikipedia, The Free Encyclopedia*, <https://en.wikipedia.org/w/index.php?title=Overlanding&oldid=1012527618> [Accessed 4 January 2021].

¹⁷ Ontario.ca. 2015. *Crown Land*. [online] Available at: <<https://www.ontario.ca/page/crown-land>> [Accessed 12 May 2021].

¹⁸ Johnson, Rhiannon. 2019. "Treaties In Ontario: What Are They And What Do They Do?". *CBC News*. <https://www.cbc.ca/news/indigenous/treaties-recognition-week-ontario-1.5351817>.

¹⁹ Lamberink, Liny. 2019. "A 200-Year-Old First Nation Treaty Is On Display At Ontario Museum". *CBC | News*. <https://www.cbc.ca/news/canada/london/longwoods-treaty-chippewas-1.5347864>.

²⁰ Temprano, Victor. 2021. "Nativeland.Ca". *Native-Land.Ca - Our Home On Native Land*. <https://native-land.ca/>. [Accessed 13 May 2021].

²¹ Wikipedia contributors, "Overlanding," *Wikipedia, The Free Encyclopedia*, <https://en.wikipedia.org/w/index.php?title=Overlanding&oldid=1012527618> [Accessed 4 January 2021].

PART 2: AN ARCHITECTURAL OBJECT – THE CHUCK BOX

What follows is the record of process, drawing and surveying directly from my personal off-grid trailer build. This is a collection of notes, sketches, photographs, and remarks over the course of the build. The design is informed throughout the construction process and reacts to pragmatic decisions and problem solving. This process is illustrated in further detail through video which has been uploaded to YouTube.



Figure 13: Process | Ice fishing with the Chuck Box

1

On February 8th, 2021, I pulled my trailer out of the workshop for the last time.

When I started this project, I did not have a clear idea of what the end result would be. At first, I had difficulty explaining to people what and why I was doing what I was doing. I must admit that I was a little naïve about how much work and time this would realistically take. That being said, this is the first piece of architecture that I am proud to call my own. I have always craved hands-on building experience, and I felt compelled to undertake the physical construction of one of my ideas at a 1:1 scale for my final thesis project.

It took roughly five months to get the project to the state in which it currently sits. Although the project may appear complete, I do not think that I will ever truly consider it done.

I am currently using this trailer.



Figure 14: Context | Paddling Scarecrow Lake, September 17th, 2020. 8:21am, -3°C

2

I grew up in a township called Hornepayne which is located a stone's throw away from the Geographic Centre of Ontario. These coordinates (49°15'0"N - 84°29'59"W) are located in what is commonly referred to as the north the province. The town has a population of less than a thousand people and basic supporting infrastructure. This township is commonly labeled as a ghost town. It is far from the main highways, lacks population and prosperous industry. This requires people of the community to have a close relationship with one another and practice a self-reliant lifestyle. Recently, more people are gaining interest in outdoor recreational activities which has increased the traffic in the north. That being said, I have always been surrounded by family and friends who camp, hunt, fish, and spend a considerable amount of time in the great outdoors.

I also love to tinker. Since I was young, I had a desire to make things, take them apart and then put them back together, modify them or even transplant things from one to another. I wanted my thesis to express who I am and where I come from.

For this project, I will be the client, designer, and builder. The project and process itself is simply a means to an end. The goal is to gain a deeper understanding of history, culture, wildlife, scenery, self-sufficiency, and hopefully learn something, and teach someone along the way.



Figure 15: Context | Fishing with my grandfather on a remote lake

3

My passion for the outdoors is owed to my grandfather and his dedication to teaching me how to be a respectful outdoorsman. He taught me how to catch and clean fish, how to distinguish different species, when to release, to respect the fishing seasons, and what to look for in a lakebed when scouting new lakes to fish.

Fishing is exciting when the fish are biting and discouraging when they are not. There is a level of patience needed so that when a fish does bite, you do not miss setting the hook. Although the end goal is to catch fish, the established mindset is about enjoying the activity and being outdoors. I have learned the importance of having the correct equipment, plans, and redundancies when venturing out to remote settings. Rituals are developed such as waking up before the sun rises so that you can make it to lake at the break of dawn. There is nothing more refreshing than taking a deep breath of the crisp morning air while out on a mirror-like lake.

The individuals I find myself out with share a similar respect toward wildlife and conservation. These people are as much hunters, anglers, and campers as they are conservationists. These relationships are forged while being outdoors. We have a responsibility to take care of the earth – not only for ourselves, but for the wildlife that we share it with. The first step toward a better environment is by reinforcing our relationship with nature, not one that is romanticized but one that focuses on understanding and using it in a respectful and responsible way.



Figure 16: Context | Living and working in a Trailer - 2020



Figure 17: Context | Living and working in a Trailer - 2020

4

I spent the better part of the summer working full-time for an architecture office from a camping trailer. The move to a trailer was due to the uncertainties caused by the COVID-19 pandemic. At the beginning of June 2020, my wife and I purchased a 26' Travel Trailer with the intentions of living and working from it – with our dog.

Transitioning from our urban apartment in Gatineau to Joli Voyageur campground in Lavigne, Ontario went relatively smooth minus the fact that we were required to get rid of a lot of stuff. The campground we stayed at offered necessary services such as hydro, sewer, freshwater, and internet. This allowed an online connection, not only for social media but for remote work and communications. My lakeview office was setup in the dinette of our trailer. When I was not working, I would often take the canoe out to go fishing, tend to our garden, or take the dog for a hike. I found myself in a healthy mindset in the midst of a rather uncertain world.

At the end of the summer, we moved back home with my parents and sold the trailer. Living in a recreational setting while maintaining a work lifestyle was the most rewarding experience from inhabiting a trailer all summer.

5 - Logistics

The hunt began for the base of my project. There were a few important logistics that I had to figure out early on:

- **Legal:** I opted to start from an existing trailer rather than build from scratch to avoid additional engineering fees that come with legalizing a self-built trailer.
- **Type:** I chose to convert an enclosed cargo trailer as they already have an envelope to work with and are stealthy. Other than that, they are a blank slate.¹
- **Size:** The smaller the trailer, the more compact and restrictive the design; however, a larger trailer threatens mobility and is more expensive to finish.
- **Age:** The age is important to consider as older trailers are typically plagued with rust and other unforeseeable problems whereas a new unit is too expensive.
- **Budget:** I had to come up with a budget. I would need it to be reasonable, but you get what you pay for. Based on preliminary research, I figured \$10,000 is a tight budget. How could I make every dollar count?
- **Schedule:** I would need to be organized and on time. My deadline was the new year of 2021. I would have to account for the winter months and find a workshop space.

6

Learning from my experiences over the summer, I wondered how mobile architecture could be used to reinforce our connection with nature. I started thinking of ways I could bridge work and life. Living and working full time in a campground encouraged the idea that immersing oneself in a recreational setting does not equate a total loss of communication with the working world. My goal became to design and build an architectural object that could take you off-grid in the physical sense but remained connected through today's technology.

I have always imagined outfitting a small trailer to facilitate the outdoor activities that I pursue. I would need a shelter that I could transport; a place for all of my equipment, something multifunctional that could adjust to the changing of seasons, uses, and landscapes it would find itself in.

I began to question the program of the RV. Could architecture operate in a similar fashion as the chuck box? Why couldn't my camper be an ice fishing shack too? Why stop there? Could it also operate as my mobile office, storage unit and hunt cabin?

This architecture would not be something to live out of full-time, but rather outfitted to support life off-grid during the adventures I may undertake.

This project is about flexibility – it is as much about getting out as it is about going to work.

7 – Acquiring a Trailer

After a few weeks of searching every buy & sell platform, I found a 2019 United XLE 5'x8' enclosed trailer for a modest asking price on Kijiji. After investigating the trailer and much internal anxiety, I decided to pull the trigger and negotiate the purchase.

On October 6th, 2020, I officially owned a cargo trailer.

After picking up the trailer, I drove home and attempted to reverse it up my steep driveway. Admittedly, it took a few tries – backing up a trailer is trickier than it looks. After it was parked, I unhooked the trailer and moved it (by hand) to a desired location where it would sit securely on jack stands and wheel chocks.



Figure 19: Process | Towing the trailer home

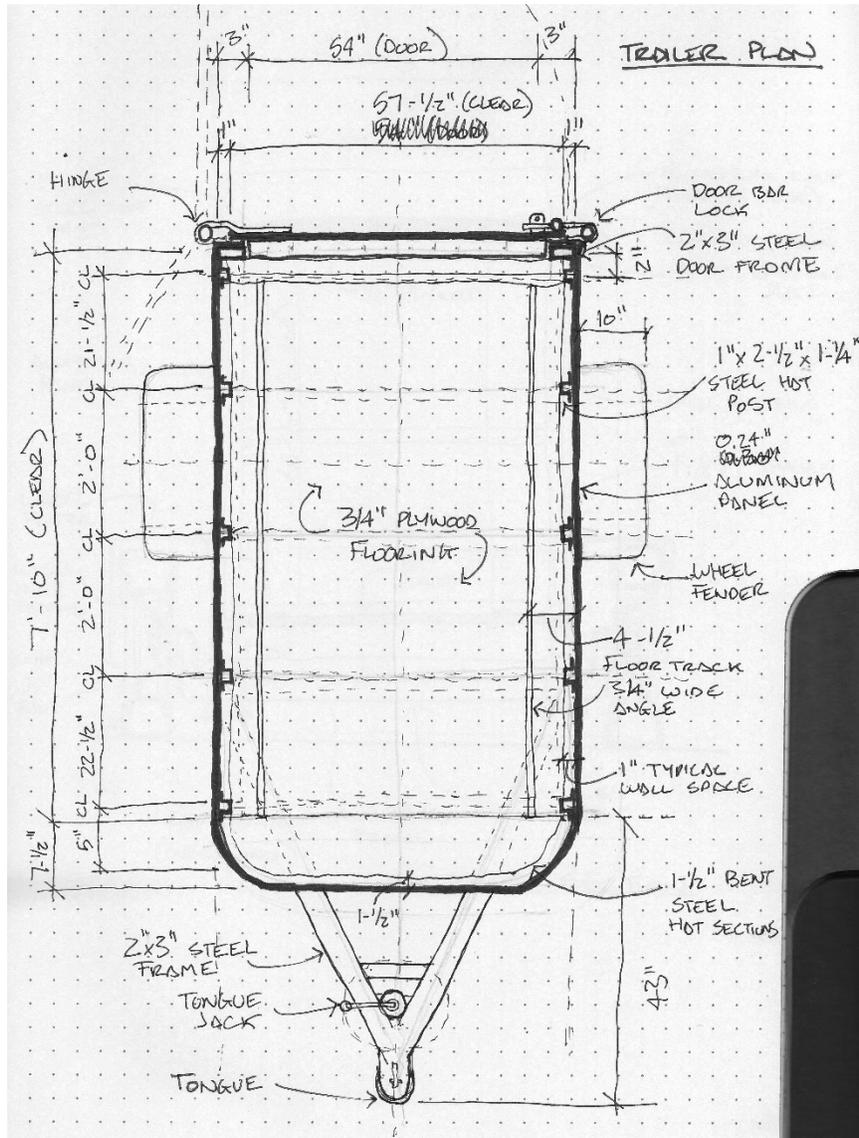


Figure 20: Process | Sketched Plan

8 - Disassembly

Naturally, after having owned the trailer for less than two hours the first thing I decided to do was take it apart. A hammer and pry bar made the perfect tools for this task. The Torx self-tapping screws fit a Robertson #2 drill bit and with the aid of an impact drill made the removal of the fasteners installed by the manufacturer a breeze.

With the interior paneling out, I began measuring every inch of my 40sqft project. The trailer has an overall exterior width of 5'-0", length of 8'-0" and height of 5'-6". The structure of the trailer is steel members placed approximately 24" on center. Hollow square tubing frames the floor and roof, while the wall studs are top hat sections. The exterior cladding is of thin gauge aluminum panels and the floor is $\frac{3}{4}$ " plywood. The empty weight of the trailer is approximately 820lbs.² I sketched detailed drawings of the trailer and developed a 3d model in Rhino.

At this point the design could begin.

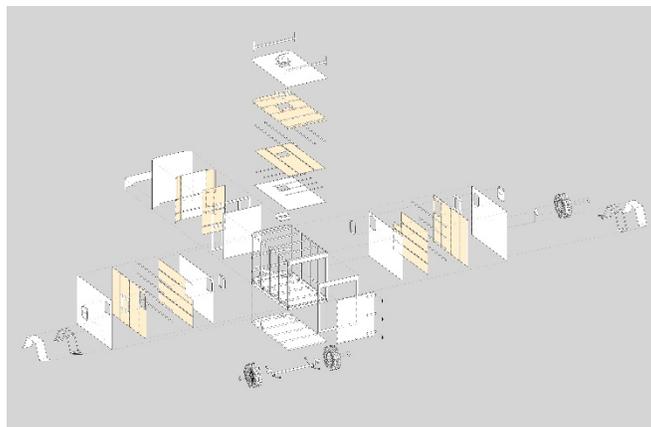


Figure 21: Process | 3D Model - Exploded Axonometric



Figure 22: Process | Interior walls removed and caulking applied

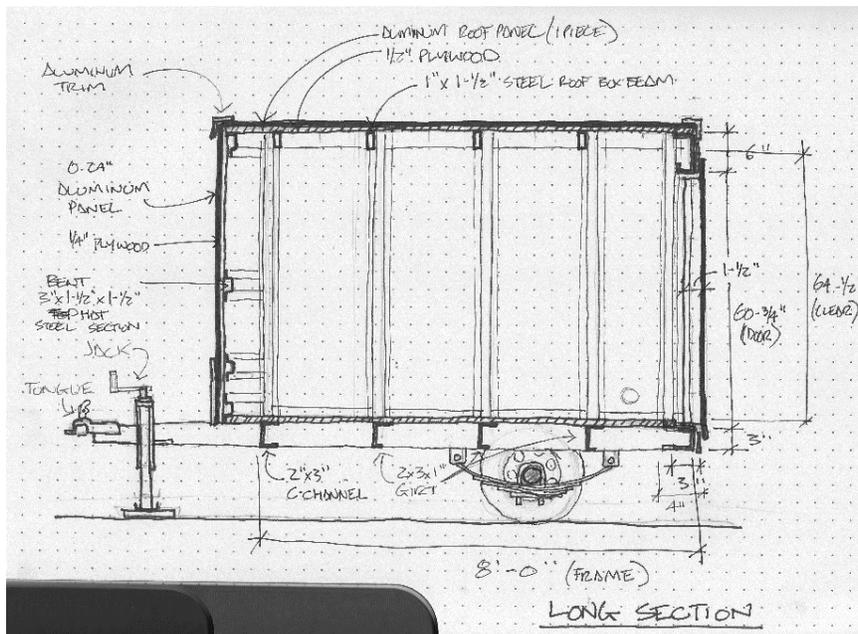


Figure 23: Process | Sketched Section

9 - Waterproofing

As I dug deeper into the deconstruction of the trailer, I began to understand how it was manufactured. More importantly, I noted all the flaws; its imperfections, and cost-cutting techniques were revealed to me.

Although cargo trailers are structurally better built than RV's, they lack basic envelope waterproofing details. Fasteners were screwed through the cladding without sealant and the alignment with structural members was poor. I was disappointed to find large gaps in the floor after removing the interior wall panels.

I started fixing these issues by applying a bead of flexible sealant along all the seams at the floor, roof, and wall studs to prevent water ingress.³ I filled the larger holes and other anomalies with expanding spray foam. After this, I tested my work with a garden hose to ensure that the envelope was truly waterproof.



Figure 24: Process | Bad Fasteners



Figure 25: Process | Hole in Floor



Figure 26: Process | Cutting the roof with a jigsaw



Figure 27: Process | Window install

10 - Ventilation

To tackle these next steps, I would need to cut holes in the trailer. This was a nerve-racking experience as I only had one chance to get it right. I ordered a roof vent from Amazon and picked up an operable RV window from my local trailer parts supply store. The roof vent, equipped with a fan, would require power to operate. These devices should serve well for air exchange and natural ventilation.

I drew the cut-out inside the trailer making sure to clear any structural members. The cutting was done from the outside. Using a small drill bit, I made a pilot hole so that I could transfer the cut-out template to the exterior. A larger drill bit provided a hole big enough to fit my jigsaw blade.⁴ I built interior framing using 2x3 lumber so that the thresholds had solid blocking to be fastened to. I applied butyl tape to the exterior flanges and secured the window and vent with screws to their respective frames. Screws were evenly torqued ensuring an even distribution.

All said and done, the install was quite stressful, but that anxiety was quickly relieved once I experienced how much natural light was coming into the trailer.



Figure 28: Process | Roof vent install

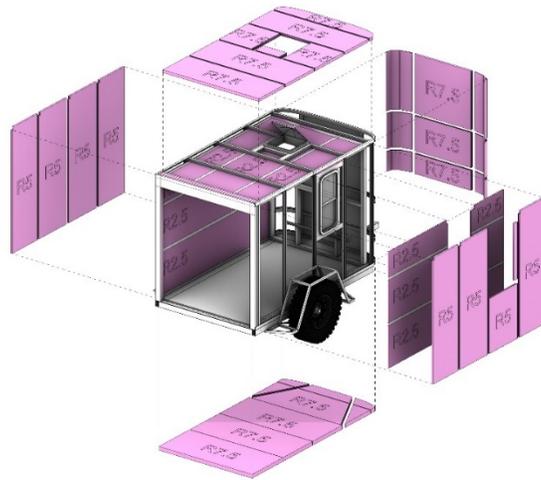


Figure 30: Process | Insulation 3d model

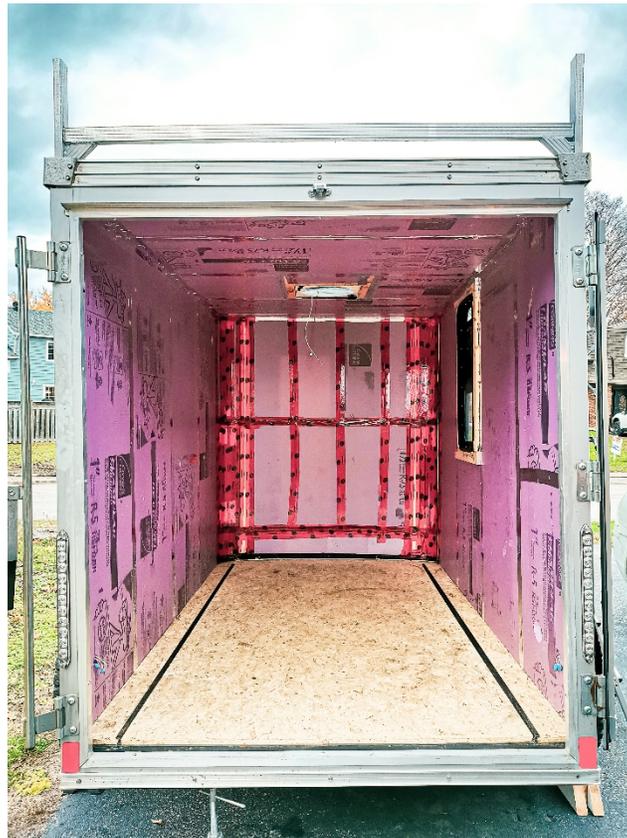


Figure 29: Process | Insulation installed

11 - Insulation

The trailer needed to be insulated if it was going to be inhabited. My 3D model helped quantify how many rigid boards I needed. Having a student budget, I decided to install XPS Rigid insulation instead of spray foam which would have been the superior route. Still, I am getting an R5 per inch; therefore, the overall R value will be between 7.5 and 10. In addition, if for any reason I am required to pull the walls apart I could do so with ease. I avoided the cheaper EPS insulation because it is not moisture resistant and chose not to install the more expensive Polyiso (insulation with reflective layer) as this type loses R value as temperatures drop.

I made a trip to Home Depot and picked up six 1" boards, six 1-1/2" boards, nine 1/2" boards, and two bottles of general-purpose spray foam. Insulation was cut using a utility knife and straight edge. Panels were press fit into their respective voids, adhered with foam adhesive, and finished with foil tape. An additional layer of insulation was installed over the studs to prevent thermal bridging. The insulation under the floor was installed using 1-3/4" screws with large washers fastened directly to the subfloor.

Eventually, I will have to enclose the exposed insulation underneath so that it does not disintegrate from the salted Canadian winter roads. However, I am confident that the space can be heated efficiently.

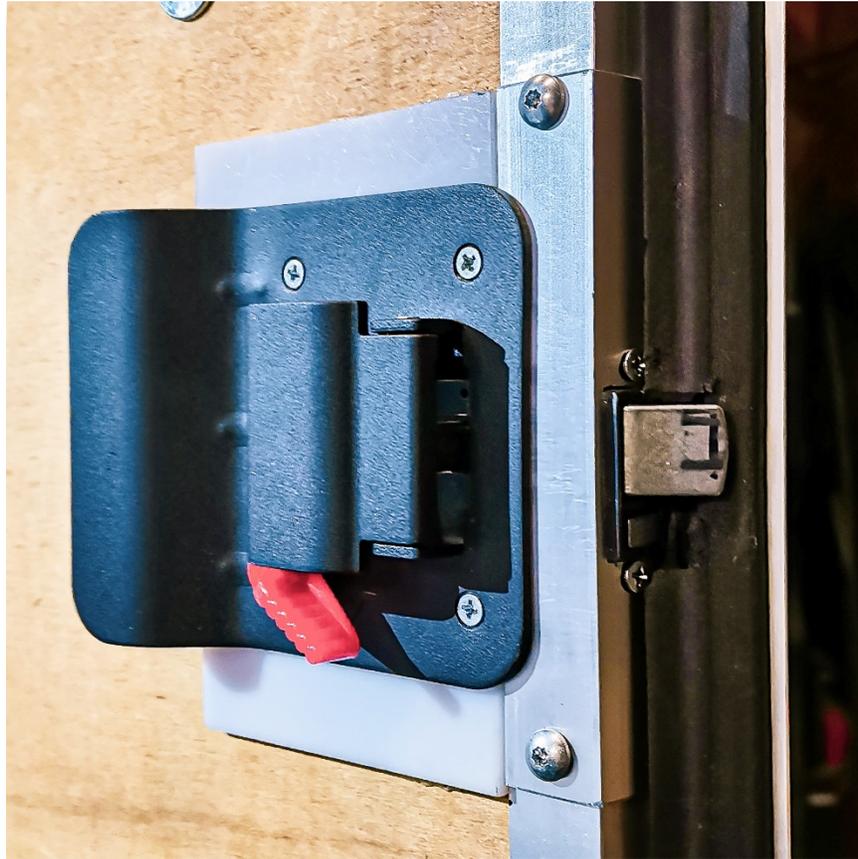


Figure 31: Process | RV door latch install

*Young man I'm so pleased to watch your hard work, I have one like yours to install and I've been putting it off. Thanks I'm ready to go now. God bless you.
(Old guy from Arkansas)*

– YouTube comment left by user Stevenbp101.

12 – Security

Traditionally, cargo trailers have not been designed to be inhabited therefore security upgrades were needed. This included the ability to open, close and lock the door from inside the trailer. I tackled this problem by undertaking the installation of a RV door latch. This proved to be one of the more challenging tasks so far. The latch kit did not come with installation instructions, and I had no luck finding supporting resources online. The assumed two-hour task turned into three full days of work.

I started by creating a mock-up with a piece of wood, measuring the latch device for the cut-out. There were a lot of things to consider before cutting a hole in the door such as: alignment, distance to the striking plate, and the thickness of the door compared to the latch. After much struggle, I decided to drill a hole into the door with a “I’ll figure it out on the fly” attitude.

A Dremel was used to clean the cutout. I purposely made the hole small so that I could work my way out as needed, ensuring a tight and secure install. A spacer plate was made to account for the thickness discrepancy between the door and the latching hardware. The assembly was finished with sealant, providing a watertight install.

In the end, I am satisfied with the install. The video on YouTube has gained a considerable view count and positive feedback. Hopefully, others can use my video to help them out and reduce their installation time.

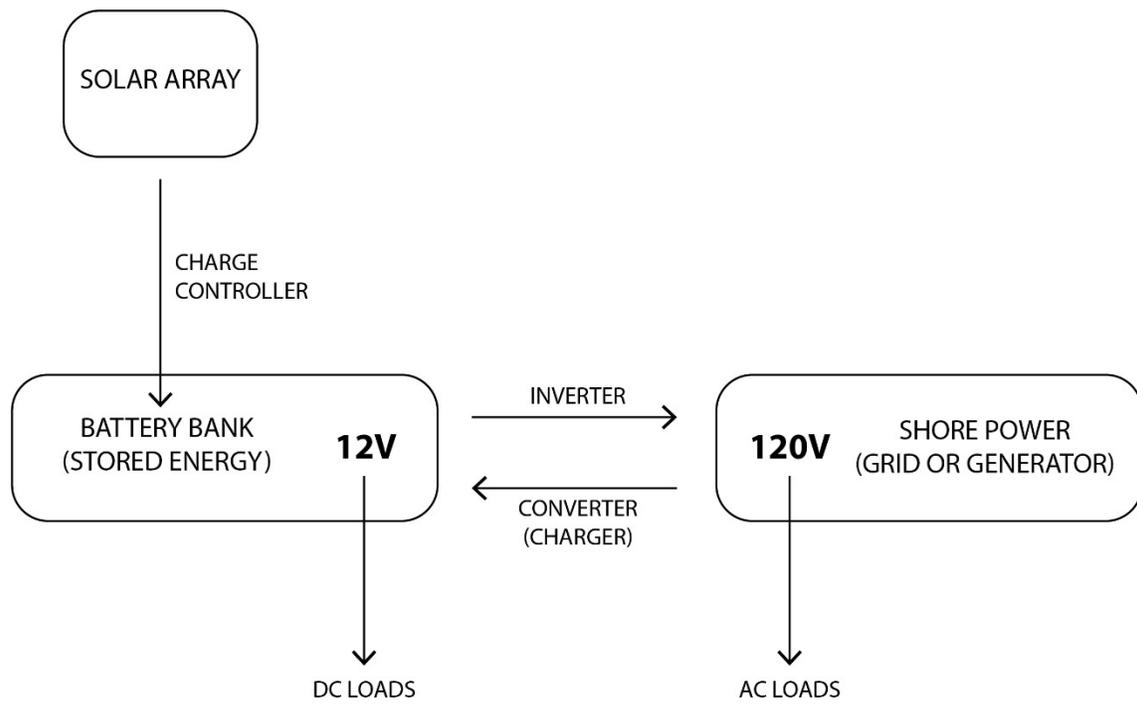


Figure 32: Process | Simple electrical diagram

13 – Electrical System

I must admit, I did not realize how complicated and expensive electrical systems are for mobile applications. The whole thesis could focus on these systems alone, but the goal is to explain the key components at an overall level. I am not an expert, but I do feel confident about my newfound knowledge.

The electrical system can be broken down into four separate categories. The first, a 12V direct current (DC) system to power the lights, fans, fuel pump, cooler, and USB outlets. This type of system is standard in RV and automobile applications. The second is a 120V alternating current (AC) which is found in homes across North America. The AC system powers various household appliances such as a coffee maker, laptop, and crock pot that plug into a standard wall outlet. The third is a shore power system, required for on-grid or generator charging applications. Lastly, the fourth is the solar system, required for off-grid, mobile charging applications. Looking at all the systems separately helps simplify the process, but in the end they all work in tandem, ensuring a fully capable off-grid trailer.

All of the components need to be sized accordingly. There is a fine balance of meeting the minimum requirements, oversizing, and staying under budget. A power audit from explorist.life⁵ is used to calculate the total anticipated Amp Hours used per day. This audit gives an approximate size for the components like the battery, inverter, and solar array.

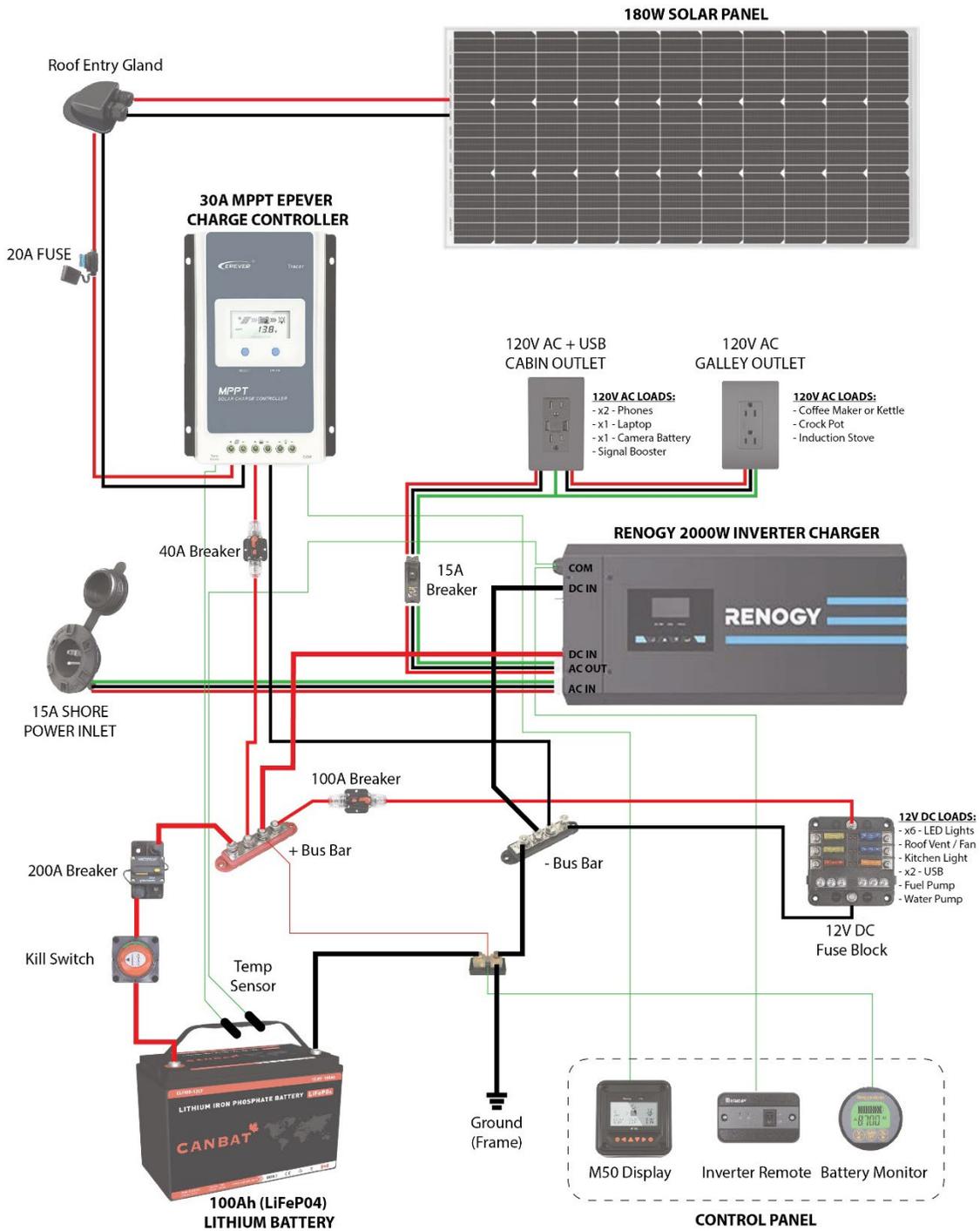


Figure 33: Process | Detailed wiring diagram

14 – Solar System

The power audit breakdown is abstract. It does not account for different seasons and activities. For example, in the summer a roof fan will be used frequently where a heater will not, but all components need to be accounted for (worst case scenario). Will Prowse offers many DIY videos on YouTube, and his book explains in more detail all of these considerations.⁶ To assist visualizing the layout of the components, I created a detailed wiring diagram (not to scale).

After a lot of research, I have made a few reflections:

1. You get what you pay for.
2. There are pros and cons to **everything**.
3. Trust expert advice. I have Richard Peters from the Sault College of Applied Arts and Technology to thank for all his help.
4. Ordering all of these components online is stressful.

On November 21st, 2020, I placed the largest Amazon order of my life. Not just in cost but in scale. At the time I placed the order, it did not feel real. It was not until the packages started to arrive that I began questioning my life choices. Why is the inverter so heavy? Did I get the right solar panel?

Boxes of various weights and sizes quickly piled up at the doorway of our house and I was left to assemble the pieces. Every component has a specific purpose, the only question is: will everything work when I wire them together?



Figure 34: Process | Lights installed, running the wires

15 – Electrical Wiring

The wiring to the lights, fan, and outlets as well as the switches to control them needed to be installed before the walls could be finished. I used 14-gauge stranded wire for the 12V DC appliances, and 14/3 stranded wire for the 120V AC outlets. I never plan on drawing more than 15amps; therefore, this gauge of wire will suffice. Stranded copper wire was used over solid core because vibrations can cause the wire to split or detach from their terminals. Wires were crimped with terminal connectors and finished with heat shrink.

I installed an outlet and LED light strip on the door where the kitchen will be. To run power to these I designed a flexible conduit which was inspired by the similar application found on vehicle doors. This conduit operates with the pivot of the door, keeping the wires inside protected.

Wiring in the battery, inverter, and solar charge controller required special attention. Every component was protected with a circuit breaker. Each run of wire was sized according to the length and current of electricity that would pass through. Thick 2/0 cable links the battery to the inverter, 8awg wire links the solar charge controller to the battery, and 4awg wire links the battery to the 12V fuse panel.

I installed six 2W LED puck lights on the ceiling. These were routed to a 12V RV switch located at the entrance. The switch was then routed to the fuse panel at the front of the trailer. I tucked the wires neatly between the wall finish and strapping. Flicking the ceilings lights on for the first time was an exciting and fulfilling moment.

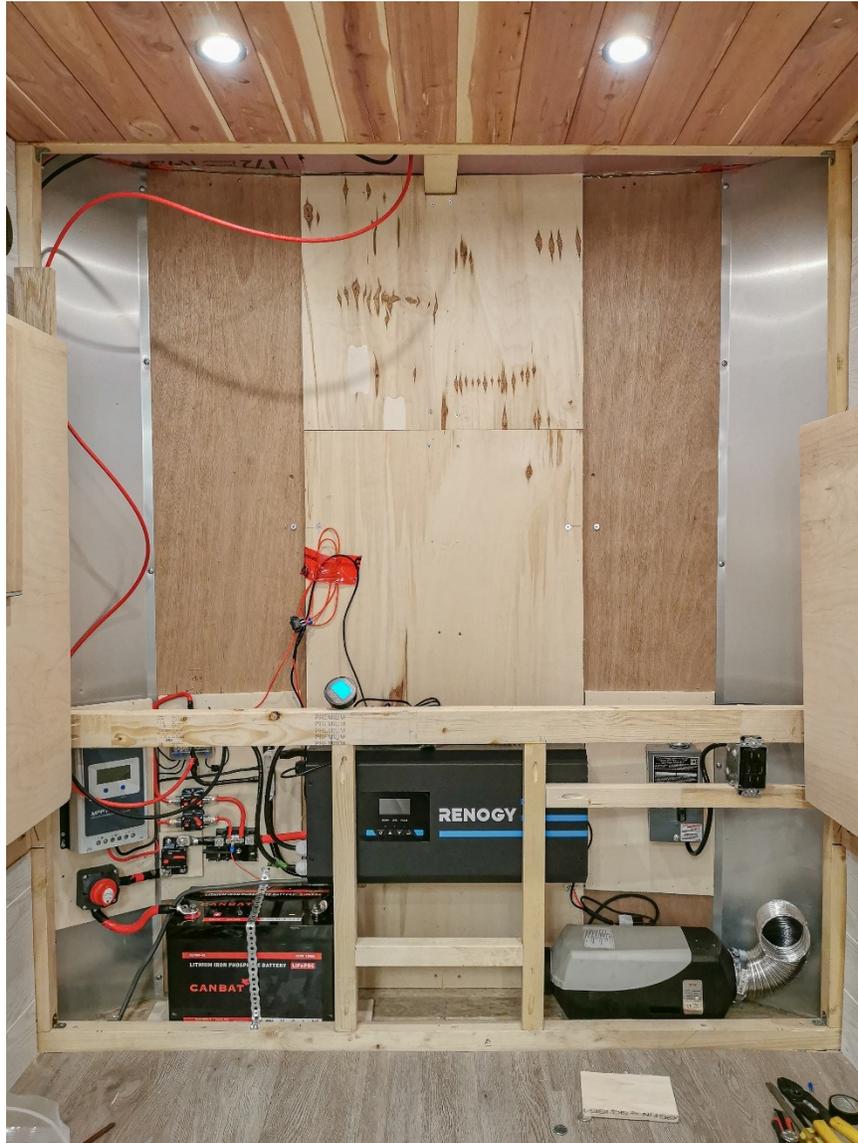


Figure 35: Process | Installing the building systems

*5KW Diesel heater (lower right), 2000W Inverter / Charger (middle),
100Ah Lithium Battery (Lower left), 30A MPPT Solar charge controller
(Upper left)*

16 – Heating

There was much debate on what method would be the best to heat the space. An electric space heater would require a much larger battery bank. Propane would be a viable option, but they have known moisture problems if not vented properly. For this project, I decided to install a small diesel air heater. These units are gaining popularity in the van-life movement because they are one of the most effective ways to heat mobile spaces.⁷ Historically, diesel heaters are installed in transport truck bunks.⁸

Just like the solar and electrical components, both expensive brand-name units and cheap knockoffs are available. Knowing the risks and having spent most of the budget on solar equipment, I opted to purchase a cheaper diesel air heater from Amazon. I chose a 5KW (equivalent to 17,061BTU/hr) heater made by Tseipoaoi. This heater is a 12V system and burns either diesel or kerosene.

The price tag of just under three hundred dollars bought me a complete kit including: the air heater, fuel cell, fuel line, fuel pump, filter, muffler, heater hose, remote control, air intake, and wiring harness. I installed the heater in the space allocated in front of the trailer. After many suggestions from individuals on YouTube, I changed my design of having the hot air output three feet above the floor to just a few inches. I installed the fuel tank, fuel pump, and filter remotely on the tongue of the trailer in a storage box which was purchased from Princess Auto. At this point, my trailer would be able to heat itself independently as long as it has fuel and power.



Figure 36: Process | Interior, bench, and table setup

I can smell the cedar while I was watching. great job

– YouTube comment left by The Arizona Homestead Project.

17 – Finishes

I had been installing architectural finishes throughout various moments of the build. I started collecting various samples from Home Depot and creating material palette boards. I had to be mindful beyond the cost and aesthetics of the materials. I had to consider the thickness, weight, and durability as they all have a drastic impact on the outcome of the space.

For the floor, I installed waterproof luxury vinyl tile on top of a 1/4" foam underlayment. Shortly after having installed the new flooring, I cut two large holes to accommodate ice fishing catch covers. The walls were finished with 2.7mm white ash panel board. The front wall and associated millwork were fabricated with 1/2" finished ash plywood. I splurged a little for the ceiling, installing 1/4" aroma cedar planks. I installed a 3/4" thick maple hardwood rail along both sides of the trailer for a mounting surface to support the bed. I built the bedframe using 3/4" pure bond maple plywood and solid oak. Depending on the use of the space, the bed can be folded up and away, pivoted semi-down as a bench, or completely down as a full-size bed. The kitchen worksurface is mounted on pivoting brackets which can be locked either in the up or down position. The backside of the bookshelf can be folded down and used as a worksurface.

I am pleased with the outcome of the ceiling as I am learning the power of how this plane influences spaces, especially small ones. I am finally able to appreciate the finishes come together and give the space its identity.

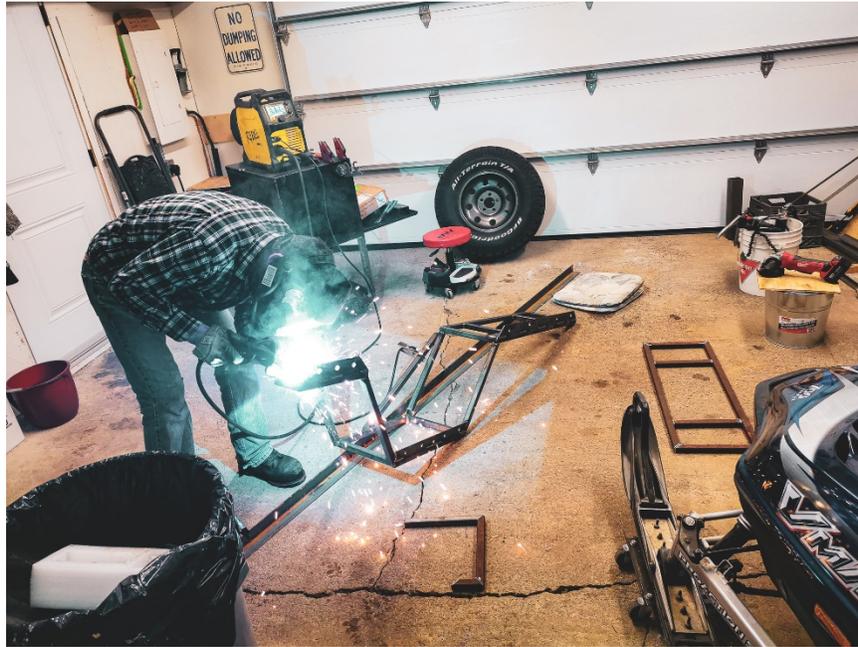


Figure 38: Process | Welding up the fenders at Alain's shop



Figure 37: Process | Custom fenders installed

18 – Wheels and Fenders

One of the first upgrades to the trailer was the installation of larger off-road wheels. The wheels were upgraded to increase ground clearance as well as match the tow vehicle for redundancy. This meant that custom fenders would have to be fabricated; ironically, these were one of the last things to be completed.

Acknowledging my lack of metal fabrication tools and skills, I reached out to a third party for the fenders. A man named Alain Parisien had an ad in the local classifieds for custom metal fabrication work. After a brief consultation, we came to an agreement that I would provide the design and he the material and labour. I had the privilege of being invited to his shop and participate in the fabrication process. Up until this point, the construction of the project had been a relatively lonely journey. It was motivating to work with another individual who is passionate about making. Unfortunately, during this time our community went into lockdown, and I was no longer able to participate in the fabrication process. Thankfully, I provided a clear design and detailed drawings for Alain to follow.

After a few months, I received the fenders which needed to be cleaned and painted. I prepped the surface with my angle grinder and painted the fenders with a black semi-gloss rust proof paint. After the paint was cured, I installed the fenders to the trailer with eleven ½” heavy duty bolts.

I can now legally tow my trailer on the road and use the fenders to mount gear and access the roof.



Figure 39: Process | Aerial photograph of the Chuck Box on the move

Working with my hands and having something to show for it at the end of the day is one of the greatest rewards that I have taken away from this journey. I have been physically engaged with the design, creating problems, and coming up with solutions for them. The Chuck Box represents not only a new way for me to occupy the landscape, but the ability to engage with likeminded groups of people.

I feel successful in my attempt to create an architecture that is suitable for my way of occupying the wilderness, a product that people understand and can relate to. I have built something real that I can use and test. I am eager to finally venture out with my trailer to partake in various exciting adventures.

NOTES

¹ Brady, K., Brady, K. and Brady, V., 2021. *Convert Your Cargo Trailer Into an RV Camper | Drivin' & Vingin'*. [online] Drivin' & Vingin'. Available at: <<https://drivinvin.com/2020/06/23/cargo-trailer-camper/>> [Accessed 16 March 2021].

² The weight of the trailer is taken from this site which posts specifications of the same make and model as mine.

<https://baytrailerdepot.com/listings/united-xle-5-x-8-ssl-black/>

³ I followed videos by Aaron Besser on Youtube for sealing the trailer <https://www.youtube.com/watch?v=OHelGalT11E>.

⁴ I used videos by Gonagain on YouTube to help with the window and roof vent installation.

<https://www.youtube.com/channel/UCYDJqPEbFc2t4MEeYtYfIT>

Q

⁵ YARBROUGH, N., 2021. *EXPLORIST.Life*. [online] EXPLORIST.life. Available at: <<https://www.explorist.life/>> [Accessed 10 January 2021].

⁶ Prowse, W., 2017. *Mobile Solar Power Made Easy!*. 1st ed. CreateSpace Independent Publishing Platform.

⁷ Mowgli Adventures. n.d. *Heating for Campervans | How to Keep your Van Warm in Winter*. [online] Available at: <<https://mowgli-adventures.com/heating-for-campervans/>> [Accessed 17 March 2021].

⁸ Wikipedia contributors, "Gasoline heater," *Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/w/index.php?title=Gasoline_heater&oldid=999472100 (accessed March 17, 2021).

Wherever I sat, there I might live, and the landscape radiated from me accordingly. What is a house but a sedes, a seat? -- better if a country seat. I discovered many a site for a house not likely to be soon improved, which some might have thought too far from the village, but to my eyes the village was too far from it. Well, there I might live, I said; and there I did live, for an hour, a summer and a winter life; saw how I could let the years run off, buffet the winter through, and see the spring come in. 30

– Henry David Thoreau, *Walden: Or, Life in the Woods*

PART 3: A MOBILE MANIFESTO

What follows is a post-occupancy reflection and critical review from using the Chuck Box. In this section, I discuss the overall performance, successes, and shortfalls of the build. Further, I present the thoughts and feelings I experienced from posting my videos publicly online and the feedback I have received.



Figure 40: Process | Photograph post Colloquium 3 presentation in the Chuck Box

I had the opportunity to use and test the trailer on a handful of occasions during the winter, which is arguably the most extreme season. From just a few outings, I have learned a considerable amount about my architecture such as its limitations, opportunities, and flaws.

The first lesson learned was that my trailer, a metal skinned enclosure, is effectively a large Faraday cage. The Faraday effect is the blocking of an electromagnetic field,³¹ in my case restricting cell service. That proved to be a problem as I would be relying on a stable signal for internet when inhabiting the trailer to work remotely. The solution was to install a cell phone signal booster. The device is powered by the trailer when plugged into the 12V outlet that I had already installed.

February 9th, 2021 was the day of my colloquium 3 presentation and the first field test for the trailer. Geared with my laptop and cell phone booster, I towed the trailer onto Lake Nipissing, just off of Sunset Bay. I parked not too far from the boat launch and began setting up for my presentation. There was a lot on the line and a lot that could go wrong: one of the systems could fail, I could lose connection, or someone could unknowingly interrupt my presentation. The exterior temperature was -12°C but the interior, with the heater running, a stable 23°C. I plugged the booster in and hot spotted my laptop from my phone. With the inverter on, I plugged my laptop in and logged into Zoom. The total electrical draw was around 5 amps and to my surprise, even in the winter, the solar panel power output was balancing this demand. For a moment, I was neutral – off grid, while presenting my thesis on a frozen lake. The presentation went off without a hitch, and I could not have been happier.

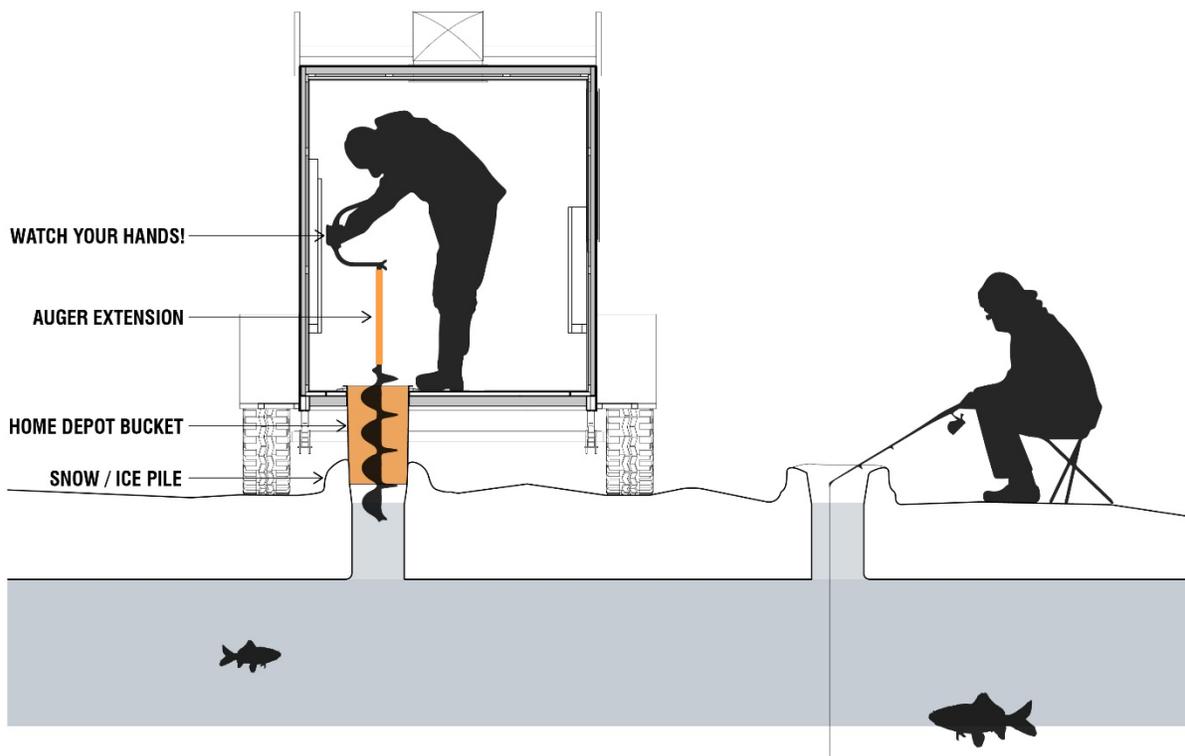


Figure 41: Process | Trailer Section, Ice Fishing Mode

To celebrate the success of the first outing, the following week I decided to take the Chuck Box ice fishing with my father-in-law. Feeling adventurous, I pulled the trailer further out from Sunset Bay to where other people had their ice shacks set up. The drive was turbulent. I hit several snow drifts measuring more than 12” deep. The larger wheels on the truck and trailer are what kept me from getting stuck. I wondered if installing skis would make this journey easier and allow for the trailer to be towed by a quad or snowmobile. Maybe in the future I could fabricate removable skis.

After finding a desirable spot, I fired up the heater and began drilling two ice fishing holes from inside the trailer. That was when I learned lesson #2 – auger extensions. My hand-held auger bottomed out on the floor before boring through the ice. This occurred because the ice was over 24” thick and the trailer an additional 14” above the ground. My temporary solution was to move the trailer forward, finish the holes outside and then reverse back over them. This issue has been resolved by installing a shaft extension to the auger. Shortly after dropping my line in the water, I learned lesson #3 – ice hole sleeves, also known as Home Depot buckets. Since the trailer sits above the ground and the Catch Covers have to remain open to fish, a cold draft would enter, rendering the space inefficient to heat. Cutting out the bottom of a bucket and inserting it between the trailer and surface of the ice mitigated this issue. The snow build-up from the bore hole can be piled up to insulate the bucket.

Overall, the first ice fishing trip with the trailer was a success. We caught a handful of fish but more importantly, the trailer kept us warm and comfortable on the lake during a windy -25°C day.

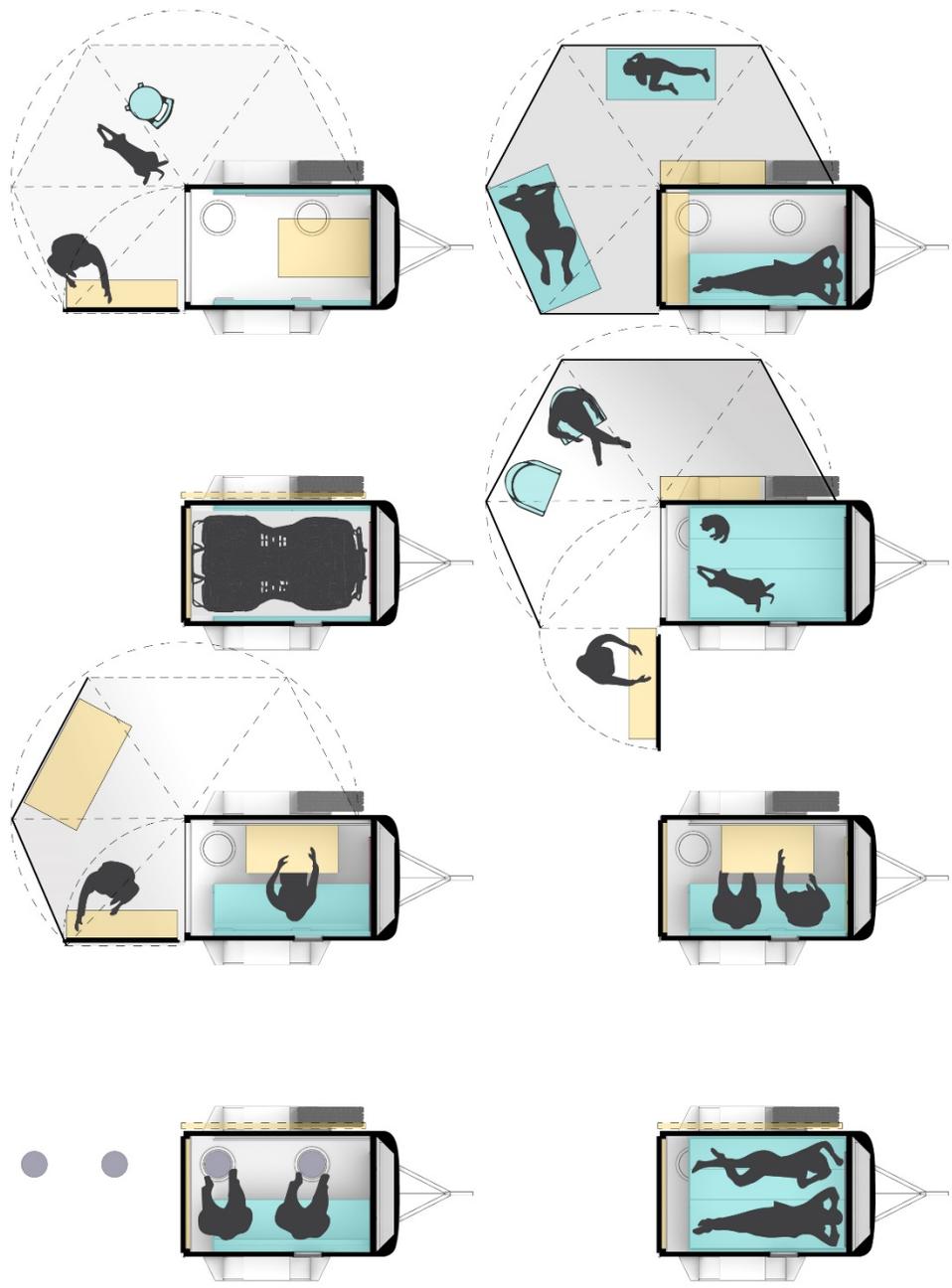


Figure 42: Process | Trailer Floor Plans

I brought the trailer ice fishing a few more times, moving to different locations on the lake, trying new things, and bringing new people. The max occupancy of the trailer is designed for two adults. I brought my wife and dog out ice fishing to test this occupancy. The space was comfortable for the three of us for the day and would suffice for overnight trips. That being said, I began thinking of ways I could expand the trailer, allowing more occupants and flexibility. A roof top tent installed on the roof of the trailer would double the sleep capacity. An alternative could be to install or fabricate a 270° awning. 5 telescoping arms connected to a single pivot point allow these devices to be erected by a single person in under 60 seconds.³² The addition of annex walls would triple the usable square footage of the trailer. When deployed, the awning would provide good outdoor coverage for the kitchen and living space.

The trailer, being only 90” long and 55” wide on the interior, definitely has its limitations. Realistically, the space is comfortable to live and work for several days. The trailer will suffice during my longer ice fishing, camping, or hunting trips. A larger and taller trailer, perhaps starting with a 6x12, would allow more amenities required to support a small family. The goal with my build was for it to be multi-programmable. I can load a small quad, haul building supplies, sleep, work, cook, and fish all within this space. The trailer may not be the most agile ice shack, but I have proven that I can successfully use it to go ice fishing – it is not a large roomy camping trailer with plumbing, but it can provide protection from the elements, throughout 4 seasons. The trailer exists in the middle: a chameleon, quickly changing its features to suit the environment it finds itself in. It is stealthy and capable, allowing the ability to stay in places traditional RVs cannot.



Figure 43: Process | Ice fishing with the Chuck Box

I track everything when using the trailer. I monitor the incoming energy from the solar controller, noting the battery voltage and power being drawn. I measure the fuel consumption of the heater and take temperature readings of the space throughout various points of the day.

Although I have not been able to take readings of the systems working during peak solar harvest season, I can confidently say that on every outing this winter, the solar system kept the battery topped off during the day.

The heater is proving to be extremely efficient on power and fuel consumption. The fuel consumption while operating the heater for +/-8 hours during -20°C temperatures was roughly 2L; this corresponds with manufacturer specifications of 0.11-0.51L/hr.³³ The electrical draw when the heater reaches set temperature is in the range of 0.5amps. Theoretically, I could run the heater continuously for 40 hours on a full tank of fuel without having to charge the battery.³⁴

I have run into a potential issue with the battery regarding cold temperatures. The Achilles' heel of lithium (LIFEPO4) batteries is that they cannot take a charge below 0°C. They can however discharge power down to temperatures of -20°C.³⁵ This would mean that in order to recharge the battery in the winter, I will have to run the heater until the space is above this temperature. It will be important that I do not leave the battery low when the trailer is not in use. A solution to this would be to install a battery heating pad and insulate the battery itself.³⁶ These small 65W pads have a built-in sensor and will only turn on when needed.³⁷



Figure 48: Process | Ceiling Gap



Figure 49: Process | Wall Gap



Figure 47: Process | Window Gap



Figure 46: Process | Crank Contact with storage box



Figure 45: Process | Wall Cut out for the fenders



Figure 44: Process | Millwork

Being critical of the construction quality of my work, it is difficult for me to look away from the little imperfections and deficiencies.

The wall transition to the ceiling could have been better. Currently, there are cuts from installing the wall where a gap can be seen. I will have to install trim to hide these gaps. I should have allowed equal spacing for the cedar planks on the ceiling along both sides so that the layout would be centered within the space. My craftsmanship of the millwork would have been more precise if I had access to a table saw. I will have to find flexible trim to finish around the window. I question the durability of the folding legs that I built for the bed. I will likely replace them with something sturdier and hardware that locks in place when opened. The 3" memory foam mattress lacks support; the solid bed frame below can be felt after sitting or lying for a long period of time. A denser material would improve this, but for now I will rely on additional blankets. A portion of the walls had to be removed in order to bolt the fenders on. If the fenders had been completed before the walls were finished, this could have been avoided. The crank for the bottle jack on the tongue of the trailer hits the storage box if you do not spin it a certain way. This jack should be replaced with a pivoting one to increase ground clearance. I would like to lengthen the tongue of the trailer to improve handling and articulation.

My design was tight. The dimensions on paper were exact and this made it difficult to coordinate the tolerances of the construction. I have learned to balance these dimensional nuances with my design aspirations. I believe this process has made me a better designer.



Figure 50: Process | Building the trailer

This is definitely the best cargo trailer conversion series on YouTube - don't know why I was lucky enough to have it pop up on my feed but am so glad it did. The attention to detail is amazing (which made more sense after finding out you're an architecture student) and the artistic/how things look component is much appreciated. I hope your series goes viral because there is a lot the world could learn from you and this build!

– YouTube comment left by user agrooters.

The channel and videos on YouTube are gaining considerable traffic. I simply started posting videos as a way to record the build process and showcase the experience in the most authentic way to my peers as school would be completed online. At the moment I am writing this (7:53PM - Wednesday, March 24, 2021) the videos all together have collectively received 53,217 views and this number continues to increase at a steady rate every day. I do not see this as a measure of success for the thesis, but as a humbling experience being able to reach a number of people that surpasses the population of the city in which I currently reside. (139,237 views – updated: May 25th, 2021).

This project allows me to engage with individuals all over the world who are equally as interested in overlanding and making as I am. Some of these individuals have even expressed that they will be using the lessons they learned from me in their own builds. I have witnessed people on social media groups suggest my content to others. I have established a way to continuously receive constructive feedback regarding my work. I am proud of my ability to teach people the values of building an off-grid camper and realizing an architecture that is relatable, exciting, and self-reliant.

I believe my project successfully bridges the things I care about and I have become more comfortable showing my design. I have gained confidence in my ability to teach others and a motivation to continue learning myself. I am inspired to make more videos, teach more people, enjoy the landscape that I find myself in, and learn everything I can about it.

5x8 Cargo Trailer to Camper Conversion - First Impressions

Nov 17, 2020 | 3:40



Part 1 of my trailer build! I have taken it upon myself to build the ultimate overlanding trailer. I want to be able to bring this hunting, ice fishing and camping as well as maintain the ability to move furniture or transport a four wheeler. This is my first impressions of the trailer after bringing it home. The first step is to take things apart! This is a 2019 United XLE 5x8 Cargo trailer.

<https://youtu.be/YMAAFs8FZVc>

ROOF VENT in my 5x8 Cargo Camper Trailer Conversion

Nov 17, 2020 | 12:03



Part 2 of my cargo trailer conversion. In this video I go through the process of installing an RV roof vent into my Off-Grid Trailer build.

<https://youtu.be/GQvUBuRo9xo>

Installing a WINDOW into the Cargo Trailer

Nov 17, 2020 | 8:18



Part 3 of the DIY OFF-GRID trailer build. In this video I go through the process of installing an RV Window into my cargo trailer camper conversion.

https://youtu.be/q3_yHbrHI-0

OFF ROAD WHEELS installed on 5x8 CARGO TRAILER

Nov 17, 2020 | 5:07



Part 4 of the trailer build series. I find a rare set of aluminum Alcoa wheels that I clean up and repaint. These wheels fit perfectly on the cargo trailer camper conversion! These wheels come stock from a Ford Ranger FX-4 Off-Road edition.

<https://youtu.be/4BrpGd2eeW8>

Adding INSULATION to the Cargo Camper Conversion

Nov 17, 2020 | 11:29



Part 5 of the cargo trailer camper conversion. I start insulating the trailer with rigid insulation boards. I go through the process of insulating the walls, roof and floor.

https://youtu.be/ZhpLKF_Dwg0

Installing 100% Waterproof Flooring into the Cargo Trailer

Nov 17, 2020 | 12:44



Part 6 of the cargo trailer build series. I install some luxury vinyl tile flooring in my cargo trailer conversion build. These floors are 100% waterproof.

<https://youtu.be/jv8bXA4AkPw>

Installing an RV DOOR LATCH into a CARGO TRAILER

Nov 17, 2020 | 22:45



Part 8 of the Off-Grid Cargo Trailer build. I spend many hours trying to install an RV door latch in my cargo trailer conversion. I hope this video is helpful for anyone trying to tackle this themselves. It is a nice thing to have all said and done!

https://youtu.be/HaN6L_trGUc

CATCH COVERS in a CARGO CAMPER for ICE FISHING!

Nov 22, 2020 | 10:02



Part 9 of the Off-Grid trailer build. I install two Catch Covers for ice fishing in my ultimate DIY overland cargo trailer conversion build.

<https://youtu.be/k02WVMydPpk>

Wood Strapping in CARGO Trailer camper

Dec 3, 2020 | 13:03



Part 10 of the trailer build. In this video I make progress on my cargo trailer conversion build by installing wood strapping to the walls and ceiling. I also discuss future plans for furniture.

<https://youtu.be/dunjwGLtwI>

Shore Power PLUG Install - Cargo Camper Conversion

Dec 8, 2020 | 9:13



Part 11 of the trailer build. I install a 15 amp shore power inlet plug (hookup) on my DIY overland cargo trailer conversion.

<https://youtu.be/9c13C9-Zceg>

Framing the DOOR - Cargo Camper Trailer Conversion

Dec 13, 2020 | 7:15



I come up with a plan and design on how to finish the door on my cargo trailer conversion. I figure out a way to insulate and run power inside the door on the DIY Off-Grid Trailer. This video I show the process of building the furring wall and how I fastened it to the door itself. I also discuss future plans regarding the kitchen.

<https://youtu.be/bVjwWibhZPg>

Wiring my DIY, Off-Grid overlanding trailer!

Dec 17, 2020 | 8:18



In this video I run most of the wiring for my Off-Grid overland trailer build. I am converting a 5X8 enclosed cargo trailer and have insulated the walls. The wiring will run in-between the metal studs and wood strapping. I come up with a cool idea on how to run power to the door which will house the galley / kitchen.

<https://youtu.be/LoLpOGqluUo>

Finishing the WALLS! - DIY Off-Grid Cargo Trailer Conversion

Dec 19, 2020 | 24:17



My wife helps me finish the walls of my diy off grid overland trailer build. The last layer of insulation is installed. I used 3mm panel board that has a white ash texture finish. The space is starting to come together nicely! It makes for a great photo booth.

<https://youtu.be/f8GLHMrmanE>

Cargo Trailer Conversion - CEDAR Ceiling install

Dec 22, 2020 | 18:42



I finish the ceiling and wire-in the lights for my diy cargo trailer conversion, off-grid overland build. I install 1/2" of additional insulation. I've installed 6 puck lights that I ordered from Amazon. The ceiling is finished with 1/4" Aroma Cedar Planks. My dog (Echo) accompanies me throughout the process.

<https://youtu.be/flykcgSORwY>

Building the Fold Down Bed - DIY Cargo Trailer Conversion

Dec 30, 2020 | 22:07



More progress on the DIY overland, cargo trailer build! The bed is a two fold down joining in the middle. This bed is a full size, which can accommodate two people comfortably! I find out the walls of my trailer are skewed!

<https://youtu.be/sjN9B-4MBh8>

Fold-Down Kitchen - Cargo Trailer Conversion Build

Jan 16, 2021 | 5:57



In this video I install the folding counter top for the kitchen in my off grid cargo overland build. I use 3/4" plywood for the counter that will be finished with a waterproof coating. I used folding brackets that I purchased from Amazon.

<https://youtu.be/7O2akFFfg28>

Unboxing: RENOGY Inverter/Charger, CANBAT Lithium Battery, Chinese Diesel Heater, and MORE!

Jan 23, 2021 | 16:51



In this video I ramble on way too long about all the off-grid equipment that I will be installing into my cargo trailer camper conversion. This is an honest unboxing review. I do not get any commission and I am not sponsored. I am also not an expert, If you see any misleading information please let me know and I will revise as needed! Please find the links below for the equipment I purchased for my build.

<https://youtu.be/aJmLDTLFBHo>

Solar Panel & Roof Entry Gland INSTALL - Cargo Camper Conversion

Jan 29, 2021 | 13:27



I finally get around to installing the solar panel on the roof of my Cargo Trailer to Camper conversion. This is my ultimate 5x8 DIY off-grid trailer build. I go through the process of mounting the solar panel to the roof of the trailer and routing the wires to the interior. I also go over a few updates on the build, future videos to come!

<https://youtu.be/QXl3hWuIEqA>

Finishing the Electrical - Cargo Trailer to Camper Conversion

Feb 7, 2021 | 13:00



Part 20 of my 5x8 Cargo Trailer to Off-Grid Camper Conversion. In this video I finish installing all of my electrical components and turn things on for the first time! I install the inverter charger, charge controller and my lithium battery. The 12V DC and 120V AC system is wired up.

<https://youtu.be/-uBRR0OkTgU>

DIESEL HEATER in Cargo Trailer Camper Conversion!

Feb 14, 2021 | 26:46



Part 21 of my cargo trailer to off-grid camper conversion build series. I install and startup my Chinese Diesel Heater for the first time. I locate the fuel cell, filter and pump remotely outside on the tongue of the trailer in a storage box. I go through the entire installation process; from how I installed the heater in the trailer to how I mounted the fuel cell.

https://youtu.be/_BWmAaY7De8

I towed my 5x8 CARGO TRAILER CAMPER on a FROZEN LAKE to FISH!

Feb 19, 2021 | 3:49



I put the trailer to the test by pulling it out onto the lake and use it to ice fish. The trailer has been out on two separate occasions now. The first, a cold -25°C windy winter day on Lake Nipissing and the second, a beautiful -10°C day on Callander bay, a part of Lake Nipissing. Fish were caught, the heater was humming, solar was charging, and most importantly, the wife and dog were happy to get out of the house!

<https://youtu.be/0nzv3gvknfw>

Fabricating Custom Fenders, Steps / Rock sliders - 5x8 Cargo Trailer Conversion (Part 1)

Mar 12, 2021 | 26:07



In this video I show the entire start to finish process of building custom fenders for my off grid overland cargo trailer camper conversion. This is part 1 of the series where I design and 3d model the fenders and then meet up with a fabricator. Together, we welded 1" square steel tube and 16 gauge steel plate. The fenders are bolted to the frame of the trailer using 1/2" x 3" bolts. The fenders are painted matte black.

<https://youtu.be/pWEFEFvtX4U>

5x8 Cargo Trailer to Off Road Camper Conversion - DIY Off Grid Overland Build *TIMELAPSE*

Mar 19, 2021 | 1:19:47



Over the course of 5 months I converted my 5x8 Enclosed Cargo Trailer into the ultimate Off Road Overlanding Camper. Watch the full time lapse showing the build from start to finish. This is a long video. You can view each step in more detail on my trailer build playlist. I will be using this trailer as I venture out into the backcountry to camp off grid, hunt and fish.

<https://youtu.be/qTmNr7HPFHg>

CAMPING and HOW MUCH did my 5x8 Cargo Conversion COST TO BUILD?

Apr 19, 2021 | 14:09



Join me, my wife, and our dog on the first camping trip with the Chuck Box. This is my 5x8 Cargo Trailer to Off-Grid-Off-Road-Overland Camper Conversion. In this video I explain in depth how much the build cost in \$CAD. I kept track of every nut and bolt (literally) and created a detailed cost spreadsheet. Along with a detailed and honest cost breakdown, I share some of our experiences camping with the trailer. We setup camp on a nice Crown Land site, process firewood and share some wine after cooking steaks over the fire. I designed this trailer to be used as my Off-Grid Hunt Cabin, Mobile Office, Ice Fishing Shack, Off-Road Tiny Camper, and Mini Toy Hauler.

<https://youtu.be/AbwypRUrRmQ>

5x8 Cargo Trailer to Off Road Camper Conversion - DIY Off-Grid Overland Trailer *FULL TOUR*

Apr 30, 2021 | 15:22



Over the course of 5 months, I converted a 5x8 Enclosed Cargo Trailer into the ultimate Off Road Overlanding Tiny Camper. My goal was to unite my architectural knowledge with the landscape I care about by building a self-sufficient mobile trailer. This is a full tour showing the trailer in action! I will be using this trailer as I venture out into the backcountry to camp off grid, work remotely, hunt, and ice fish. You can view each step in more detail of how I built this trailer on the Chuck Box Trailer Playlist.

https://youtu.be/JnXVnp_p9RY

The undertaking of a design and build of the trailer was inherently an individual and intimate journey. There is no escape from that as the construction of something for one's own use will always be personal. The trailer itself is a tangible result to the way I see and behave in the wilderness. With that in mind, the fundamentals that the Chuck Box represents spans far beyond my singular vision. The YouTube and the maker communities nested within are all a part of a greater meshwork.

The videos have helped thousands of people from other communities outside of Overlanding. The roof vent installation helped a contractor with moisture problems in their construction trailer.³⁸ The ideas of self-sufficiency while on the move carries throughout into the camping communities and has introduced me to the Crown Land Camping of Ontario group where I am now an active moderator. Additionally, the content has been well received in the Cargo Trailer Conversions group, where thousands of people are working on their own types of conversions that range from high end fully self-sufficient tiny homes to mobile dog grooming units. These diverse communities are run by individuals who are passionate about what they do and use mobile architecture to express who they are.

I have learned that if the foundations of architecture are replaced with wheels, the fundamentals of thermal comfort, building science, and spatial well-being are still relevant. Architecture can be found in the back country, in a park, or on the road, moving, adapting, and equally immersed within the landscape as the occupant. The only limit is the imagination of the architect.

NOTES

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- ³⁰ Thoreau, Henry David, 1817-1862. 1948. *Walden: Or, Life in the Woods. On the Duty of Civil Disobedience*. New York: Rinehart.
- ³¹ Wikipedia contributors, "Faraday cage," *Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/w/index.php?title=Faraday_cage&oldid=1004773704 (accessed March 22, 2021).
- ³² 23ZERO Canada. 2021. *Peregrine 270 Awning - Left Mount | Roof Top Awning | 23ZERO Canada*. [online] Available at: <https://23zerocanada.com/product/peregrine-270-us-drivers/> [Accessed 24 March 2021].
- ³³ VVKB. 2021. *Diesel Heater: The Ultimate Guide - VVKB*. [online] Available at: <https://www.vvkb.com/diesel-heater/> [Accessed 24 March 2021].
- ³⁴ This calculation is based on a full tank (10L) of fuel and an efficiency of 0.25L/hr. I could run the heater for an estimated 75 hours with a full battery, given that I keep fuel in the tank.
- ³⁵ Canbat.com. 2021. [online] Available at: <https://www.canbat.com/downloads/CLI100-12.pdf> [Accessed 24 March 2021].
- ³⁶ Systems, S., Environment, H., Prowse, W. and Prowse, W., 2021. *LiFePO4 heating pad for cold temperatures*. [online] DIY Solar Power Forum. Available at: <https://diysolarforum.com/threads/lifepo4-heating-pad-for-cold-temperatures.5/> [Accessed 24 March 2021].
- ³⁷ Amazon.ca. 2021. [online] Available at: https://www.amazon.ca/gp/product/B01MT9EUG9/ref=ox_sc_act_title_2?smid=A16G53YHOQFM2H&psc=1 [Accessed 24 March 2021].
- ³⁸ A friend of mine who uses a 7x14 cargo trailer for his construction business shared with me that my video helped him with the install of a roof vent on his trailer.

This then is the Canada that lies back of your civilization, the wild, fierce land of desperate struggle and untold hardship, where Romance holds sway as it did when Canada was one vast hunting ground. This is the last stronghold of the Red Gods, the heritage of the born adventurer. In this austere and savage region men are sometime broken, or aged beyond their years; yet to those who are able to tune in on their surroundings, and care to learn the lessons that it teaches, it can become a land of wild, romantic beauty and adventure.

Up beyond the wavering line of the Last Frontier lies not merely a region of trees, rocks and water, but a rich treasure-house, open to all who dare ordeal of entry, and transformed by the cosmic sorcery of the infinite into a land of magic glades and spirit-haunted lakes, of undiscovered fortunes, and sunset dreams come true.

This is the face of Nature, unchanged since it left the hands of its Maker, a soundless, endless river, flowing for-ever onward in the perpetual cycle which is the immutable law of the universe.

— Grey Owl, The Men of the Last Frontier



Figure 51: Process | First night camping with the Chuck Box

CONCLUSION

I am currently sitting in the Chuck Box near a lake, about 20 kilometers south of Temagami, Ontario. I am spending the last hour of my evening writing this conclusion. This is the first overnight camping trip with the trailer, as well as the first overnight outing for my wife, our dog, and I after a seemingly unrelenting winter. There is still some snow on the ground, and the weather is in that temperamental state where dressing in layers is key. The weather network is calling for freezing rain overnight; thankfully, we have a warm and secure shelter where we can lay our heads.

Earlier today, as I was completing one of my favorite tasks, foraging firewood, I was reminded of the values of being outdoors. The energy we expended while cutting and processing firewood would later provide comfort for the remainder of the evening. I was present, aware, awake, and for a brief moment, free from the momentum of life that tends to keep one occupied on a daily basis. After the bulk of the processing was done, we cooked dinner over the fire and watched the sun set while sharing a bottle of wine.

Although this is a short trip, this is a moment that I will remember for the rest of my life. I feel pride in my ability to unite my architectural knowledge with the landscape I care about. I am excited and looking forward to whatever adventures lay ahead.

BIBLIOGRAPHY

- Bachelor, John B. 1874. *Popular Resorts, and How to Each Them*. Library of Congress.
- n.d. *Bushmen, Tarpology - know-how to set up a shelter in the wild*. Accessed December 28, 2020. <https://www.bushmen.pl/en/tarpology/>.
- Flores, Dan. 2017. *Coyote America*. New York: Hachette Book Group.
- Forestry, Ministry of Natural Resources and. 2015. *Ontario - Crown Land*. August 27. Accessed January 4, 2021. <https://www.ontario.ca/page/crown-land>.
- Hailey, Charlie. 2009. *Camps: A Guide to 21st-Century Space*. The MIT Press.
- . 2008. *Campsite: Architectures of Duration and Place*. LSU Press.
- Harari, Yuval Noah. 2016. *Sapiens, A Brief History of Humankind*. United States of America: Random House of Canada Limited.
- Mills, Leroy. 1946. *Tin Can Tourists - History*. Accessed January 4, 2021. <https://tincantourists.com/2818-2/>.
- Murray, William Henry. 1899. *Adventures in the Wilderness; Or, Camp-Life in the Adirondacks*. Scholarly Pub Office.
- Owl, Grey. 1931. *The Men of the Last Frontier*. Toronto: The Macmillan Company of Canada, Limited.
- Petersen, David. 1997. *A Hunter's Heart*. New York: Henry Holt Paper Company.
- Prowse, William. 2007. *DIY Solar Power with Will Prowse*. Accessed December 24, 2020. <https://www.youtube.com/c/WillProwse/videos>.
- Roke, Rebecca. 2017. *Mobitecture*. London: Phaidon Press Limited.
- Scott, Scott Brady & Matt. 2020. "What is Overlanding?" *Overland Journal*.
- Silvey, Joel. 2009. *Pop-up Camper Hisotry*. Accessed 12 23, 2020. <http://www.popupcamperhistory.com/history1.php>.
- Smith-Rodgers, Sheryl. n.d. *American Profile - Cowboy Cooking*. Accessed December 28, 2020.

<https://web.archive.org/web/20090708090334/http://www.americanprofile.com/article/5321.html>.

Thoreau, Henry David. 1854. *Walden; Or, Life in the Woods*. New York.

Wilson, Hap. 2011. *Temagami - A Wilderness Paradise*. Richmond Hill: Boston Mills Press.

Yarbrough, Nate. n.d. *Explorist Life*. Accessed December 23, 2020. <https://www.explorist.life/>.

Young, Terrance. 2018. *Smithsonian Magazine - A Brief History of the RV*. <https://www.smithsonianmag.com/innovation/brief-history-rv-180970195/>.

APPENDIX

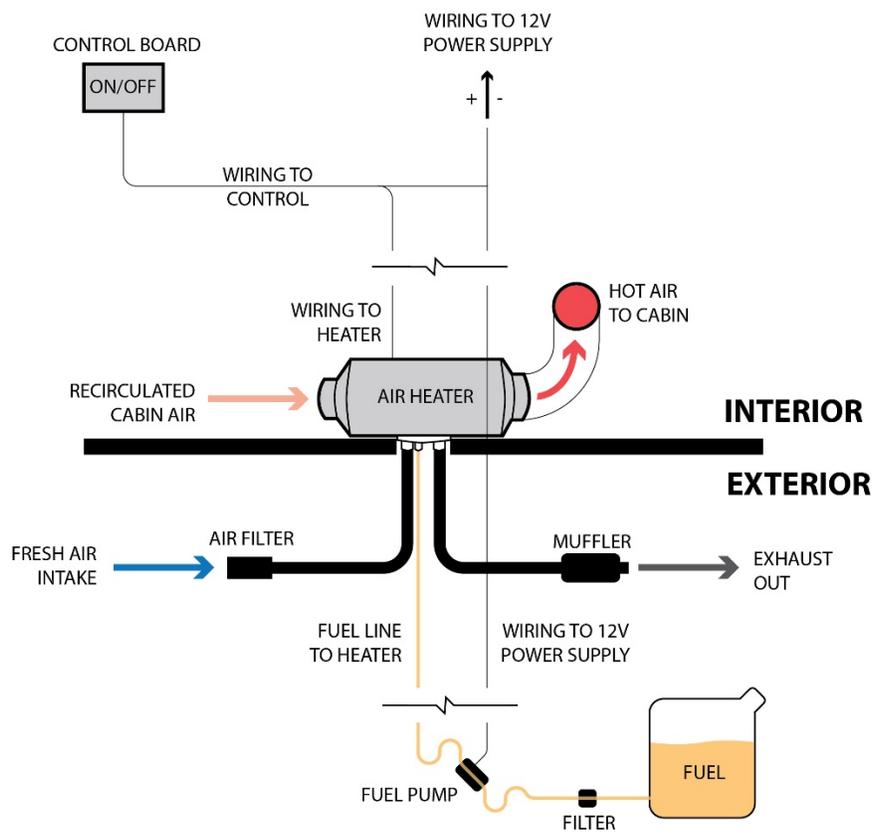


Figure 53: Process | Diesel Heater Diagram

NAVIGATION APPLICATIONS, MAP COLLECTIONS & GPS



Google Earth Pro

Google Earth Pro is free for anyone to use. It is a great way to scout new areas by reviewing satellite imagery and timeline feature. This app provides the essential basics of the landscape such as topography, roads, lakes and distances.

Available at: <https://www.google.com/earth/>



Crown Land Use Policy Atlas

This tool contains area-specific land use policy for Crown lands in central and northern Ontario. This area represents more than 39 million hectares of land and water. The Atlas allows users to view Crown land use area boundaries and create maps for a variety of purposes, including recreational.

Available at: <https://www.ontario.ca/page/crown-land-use-policy-atlas>



GAIA GPS App & Maps

This is my favorite navigation app. It outlines detailed off road trails and offers overlays from other disciplines. Maps can be downloaded and saved, perfect for when there is no service. There is a Free version available, however I suggest paying the membership.

Available at: <https://www.gaiagps.com/canada/>



iOverlander GPS Waypoints

This is a fantastic, nonprofit app. iOverlander is a tool, by and for overlanders, which enables its users to submit, amend and find information and opinions, primarily about places that are essential for the act of overlanding, and secondarily non-essential places that are of interest to a significant group of overlanders.

Available at: <https://www.ioverlander.com/>



Backroad Mapbook Collection

Nothing beats a real map book. Backroad Mapbooks feature Canada's most detailed topographic maps and outdoor recreation information, plus industry-leading road and trail coverage. Trusted by Canadian outdoorspeople for over 25 years, these maps are the ultimate adventure guide.

Available at: <https://www.backroadmapbooks.com/>



Navionics Marine Charts

The Boating App provides nautical charts for cruising, fishing, sailing, diving and all the other activities on the water. This app provides HD bathymetry maps, relief shading, satellite overlay and sonar imagery. There is a free version available and so far this has sufficed for me.

Available at: <https://www.navionics.com/usa/>

Figure 54: Process | List of Navigation Apps and Maps

OUTDOOR DOCUMENT TYPES, LICENSES & PERMITS



Camping Pass

To use and camp in Provincial Parks of Ontario, a reservation and / or permit is required. These can be purchased online or onsite. This is for any Frontcountry and Backcountry sites located within Provincial Park Boundaries.

Available at: <https://www.ontarioparks.com/en>



Outdoors Card

In order to legally hunt and fish in Ontario, an Outdoors Card is required along with Licenses pertaining to the activity. These licenses are renewed annually and is the document an Officer of the Ministry of Natural Resources will request to see. To be eligible to hunt, a hunting course and test will need to be completed.

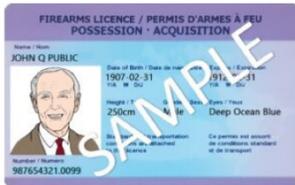
Available at: <https://www.huntandfishontario.com/>



Boating License

All motorized boat operators in Canada must have proof of competency, such as a Pleasure Craft Operator Card, (more commonly known as a boating license) regardless of age, length of boat or engine horsepower.

Available at: <https://www.boatsmartexam.com/ca/>



Firearms Possession License

A firearms licence shows that the licence holder can possess and use firearms. Individuals aged 18 years or older can make application for a Possession and Acquisition License. In order to do so, they must first successfully complete the Canadian Firearms Safety Course.

Available at: <https://www.rcmp-grc.gc.ca/en/firearms/licensing/>



Awarded Hunting Tag / Permit

Individuals must apply for a tag before hunting. A tag will specify the type, age and sex of the animal you are permitted to harvest, as well as the location, season and firearm type (if applicable). Tags are typically awarded as a lottery based system. A hunter report is mandatory at the end of every season.

Available at: <https://www.huntandfishontario.com/>



Landowner-Hunter Agreement (Private Land)

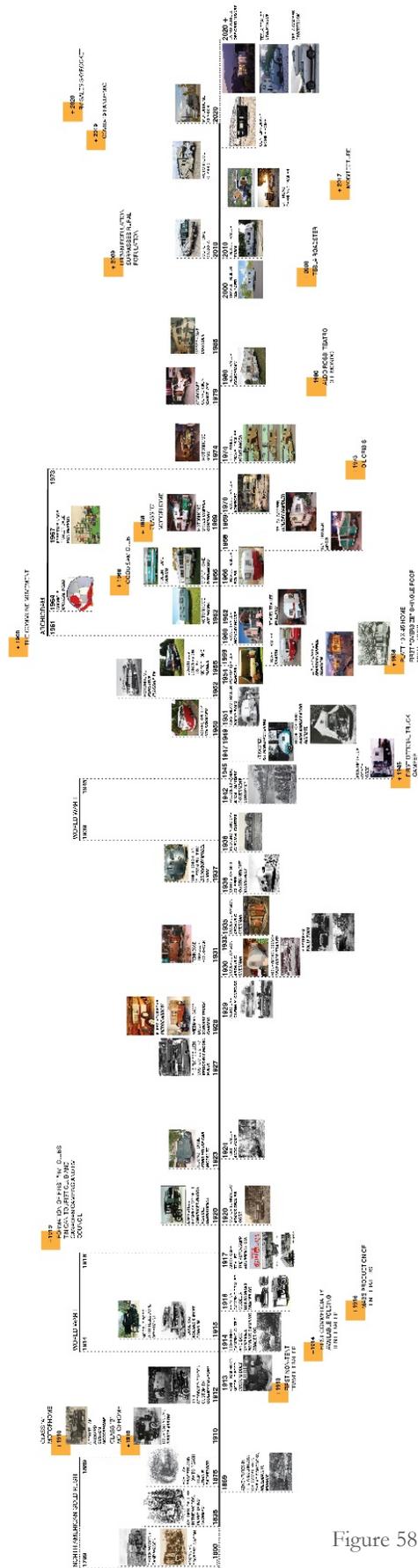
Hunters must obtain permission from the landowner (written is preferred) before hunting on their land. Hunting on private property without permission is illegal. The OFAH has developed a landowner permission form to help landowners and hunters outline the details of their agreement.

Available at: <https://www.ofah.org/fishing-hunting/hunting/>

Figure 55: Process | List of Outdoor Document Types

TRAILER BUILD COST / BUDGET			
ITEM	PRICE	NOTES	MERCHANT
Startup & Upgrades	\$ 3,739.00		35%
5x8 Cargo Trailer	\$ 3,000.00	2019 United XLE Cargo	Private Sale
Registration	\$ 137.00	Taxes & Plates	MTO
Off Road Wheels	\$ 500.00	31x10.5" BFG Goodrich K0, 15" Alcoa Wheel	Private Sale
Paint & Supplies	\$ 102.00	To refinish wheels	Canadian Tire
Envelope & Waterproofing	\$ 802.15		7%
Rv Door Latch	\$ 62.15		Lori's Trailer Sales
Roof Vent	\$ 271.00	Vent	Amazon
RV Window	\$ 349.00	Window	Northern RV
Sealant	\$ 85.00	Caulking, Self leveling sealent & Butyl Tape	Northern RV
Lumber	\$ 15.00	2x3x8 for interior frame	Home Depot
Hardware	\$ 20.00	Self tapping screws, washers & screws	Canadian Tire
Insulation & Rough Framing	\$ 663.49		6%
Insulation & Strapping	\$ 552.26	Strapping, Rigid boards, Spray foam & Foil Tape	Home Depot
Lumber	\$ 91.23	2x2x8, 2x3x8 misc wood	Home Depot
Hardware	\$ 20.00	Screws	Home Depot
Finishes	\$ 1,171.75		11%
Plywood	\$ 267.75	48x96x0.5 Aspen Ply & 48x96x.75 Maple Ply	Home Depot
Hardwood	\$ 95.97	1x3x8 Oak Boards	Home Depot
Flooring	\$ 235.55	LVT Floor & Underlayment	Rona
Ceiling	\$ 196.59	.25 Aroma Cedar Planks	Rona
Walls	\$ 147.90	2.7mm Aspen Panel Board	Rona
Mattress	\$ 142.99	3" Bamboo memory Foam	
Catch Covers	\$ 85.00	Ice Fishing Hole Covers	Cabelas
Hardware	\$ 180.83		2%
Metal Barrel Bolt Spring Loaded	\$ 19.99	For bed x6	Amazon
Barrel Bolt	\$ 7.99	For millwork	Home Hardware
Hinges for bed	\$ 29.97	6 pack 3-1/2" hinges	Home Depot
Hardware for millwork	\$ 33.28	hinges, cabinet doors, access panel	Home Depot
Folding Shelf Brackets	\$ 29.76	For table	Amazon
Misc Hardware	\$ 59.84	Fasteners	Home Hardware
Electrical	\$ 2,967.31		28%
Battery	\$ 1,124.35	100Ah 12V Canbat Lithium LiFePO4	Canbat
Inverter / Charger	\$ 649.99	2000W Renogy PCL Series Inverter Charger	Amazon
MPPT Solar Charge Controller	\$ 218.99	MT50 Remote and EPEVER 30A MPPT	Amazon
Solar Panel	\$ 189.99	180W BougeRV Solar Panel	Amazon
Battery Monitor	\$ 69.50	AiLi Battery monitor system	Amazon
Wires & Connectors	\$ 233.05	2/0, 10AWG,8AWG,4AWG,14AWG & 14/3 Wire	Bumper to Bumper
Pod Lights	\$ 43.99	12V LED 2W	Amazon
Light Strip	\$ 20.99	12" LED Light Bar	Home Hardware
Flexible Conduit	\$ 19.63	1/2" Cord Connector and Loom	Home Hardware
Light Switches	\$ 12.99	RV Double Light Switch	Northern RV
Fuse Block	\$ 23.98	6 Blade 12V Fuse Box	Amazon
Shore Power Hookup	\$ 24.99	15A -125V Port Plug	Amazon
Negative Bus Bar	\$ 24.98	100A Bus Bar	Amazon
Battery Kill Switch	\$ 22.99		Amazon
Solar Cable	\$ 36.99	BougeRV MC4 Solar Cable	Amazon
Solar Panel Brackets	\$ 9.99	BougeRV	Amazon
Receptacles, Elect. Boxes	\$ 135.00	120V AC Outlets, Boxes and Misc	Home Depot
Breaker Box	\$ 28.99	Square D Load Center 30A	Amazon
Breaker	\$ 12.94	15A Circuit Breaker	Amazon
100A Circuit Breaker	\$ 18.50		Amazon
30A Circuit Breaker	\$ 18.50		Amazon
200A Circuit Breaker	\$ 25.99		Amazon
Heater	\$ 432.40		4%
Diesel Air Heater	\$ 285.99	5KW Tseipoaoi 12V Fan Heater	Amazon
Trailer Storage Box	\$ 99.99	Exterior Tongue Storage and tank mount	Princess Auto
Ducting	\$ 17.99	3" flexible ducting	Home Depot
Fuel	\$ 28.43	20L Diesel Fuel	Canadian Tire Gas
Fenders	\$ 797.08		7%
Fabrication Cost	\$ 650.00	Material & Labour	Private Sale
Paint & Supplies	\$ 85.25	Spray Paint and Grinding disk	Home Depot
Hardware	\$ 61.83	Bolts, Nuts & Washers	Home Hardware
Safety	\$ 216.31		2%
Fire & Carbon Monoxide	\$ 97.31	Fire Extinguisher & Smoke, Fire, CO2 Detector	Home Depot
Hitch Lock	\$ 45.50	To prevent Theft	Northern RV
Stabilizer Jacks	\$ 73.50	Stabilize Trailer	Northern RV
Total Cost	\$ 10,970.32		
Sold Stock Trailer Wheels	\$ 200.00		Private Sale
Sold Stock Fenders	\$ 50.00		Private Sale
GRAND TOTAL	\$ 10,720.32		100%
Cost / sqft	\$ 268.01		40sqft

Figure 57: Process | Trailer Budget / Price Breakdown



MOBILE ARCHITECTURE TIMELINE

Figure 58: Process | Mobile Architecture Timeline

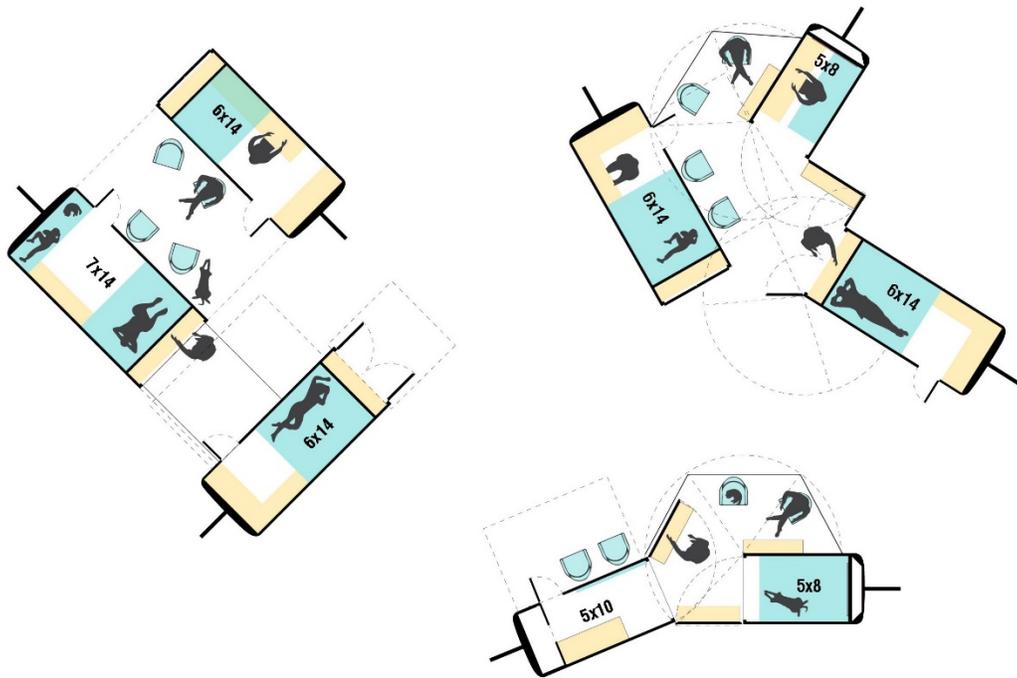


Figure 59: Process | Possible trailer arrangements

TRAILER PROGRAMS



Work Mode



Camping Mode



Cooking Mode



Ice Fishing Mode



Stealth Mode



Utility Mode

Figure 60: Process | The various trailer programs / functions

