ENAC 1†X0

MINI PROJECTS

PROJECT T.R.V

Group – 05

Supervised by: Mrs. Shyama Wickremasinghe

Degree of Bachelor of Engineering Technology Honors

Faculty of Technology

Wayamba University of Sri Lanka

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Acknowledgement

We would like to express our sincere gratitude to everyone who contributed to the successful completion of our mini project on designing a caravan vehicle. Special thanks go to our team members for their hard work and dedication. This project, aimed at enhancing the Sri Lankan tourist industry, involved designing a caravan with a length of 5 meters, a width of 2.2 meters, and a height of 2.3 meters. The vehicle is divided into four main parts: the power supply unit (0.5 x 2.2 square meters), washroom (1 x 2.2 square meters), kitchen (1.7 x 2.2 square meters), and bedroom (1.8 x 2.2 square meters). We hope this project will contribute positively to the growth of tourism in Sri Lanka.

Introduction

At first, we have identified a problem in terms of Sri Lankan hotel & tourism. That is the **Caravan** concept in Sri Lanka. Although caravan is very popular in foreign countries except in Sri Lanka. According to the current situation in our country, importing these types of vehicles is slightly difficult. The other thing is that tourist face many difficulties while going adventures, trips such as camping.

Background Information

What We expect from this project

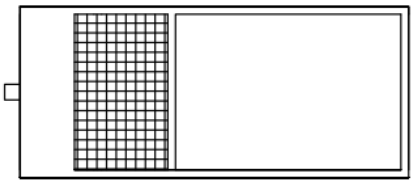
- Launching Our Own Product
- Create more Job Opportunities
- Export & Foreign exchange earning

The Services We expected to provide to Customers from this Project

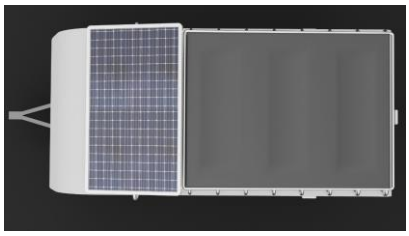
- Make Tourists Safety

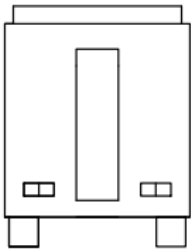
  (Animal Attracts, Bad Weathers)
- Make Tourists Life Easier
- Providing a comfortable journey with low budget

Exterior design

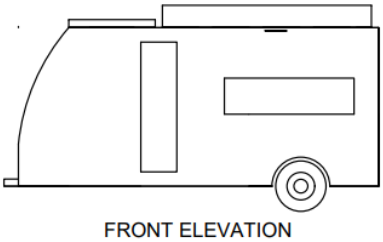


PLAN



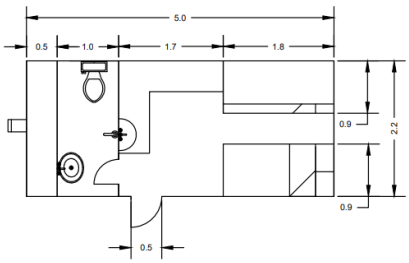


END
ELEVATION

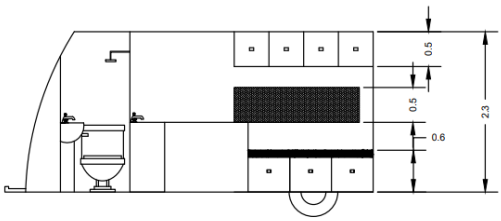


FRONT ELEVATION

Interior design



INSIDE PLAN



FRONT CROSS SECTION

Aerodynamic shape

The caravan's outer design is optimized for reduced drag and wind resistance. This improves fuel efficiency and lowers operating costs during transport. The Exterior Incorporates Stylish Elements, Colors, And Branding That Make the Caravan Visually Attractive and Aligned with The Tourism Industry. This Helps It Stand Out and Appeal To Potential Travelers.

Methodology

To design the caravan vehicle for our mini project, we utilized Blender and AutoCAD software. We began by creating detailed drawings using third angle projection in AutoCAD to accurately represent the dimensions and layout of the caravan. This helped us ensure that all components were properly aligned and functional. Next, we used Blender to develop a 3D model of the caravan, allowing us to visualize the design in a more dynamic and realistic way. We also created an animated 3D module to demonstrate how the different parts of the caravan come

together. This combination of technical drawings and 3D modeling provided a comprehensive understanding of the design and functionality of the caravan.

Design of the caravan

Space Planning

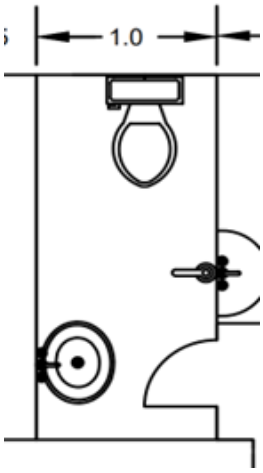
- Balanced layout for storage, sleeping, and amenities
- enough storage space for travelers' belongings
- Comfortable sleeping options like beds, bunks, or convertible seating

Amenities

- Key features like kitchenette, bathroom, and living/dining area
- Provide a self-contained living environment for travelers

Washroom Design

- This part aims at a complex and important process of designing and arranging a washroom for a travel trailer.
- The restroom in the caravan van is more than simply a place to perform basic hygiene, it is a thoughtfully designed area where comfort, space optimization, and practicality come together to offer an enjoyable traveling experience.



Plumbing System

- Washroom
- A 600 Liter Water Tank
- Reusable Gully Box

Electrical System

Main power sources.

- 12v batteries.
- Power generator.
- Solar panels.

Calculation of electrical system.

Electrical Appliances:

- Ceiling Lamps (10W each):
  Number of lamps: 3
  Total power: 3 lamps * 10W = 30W
- Outdoor Garden Lamps (30W each):
  Number of lamps 3
  Total power: 3 lamps * 30W = 90W
- Electric Kettle:
  Power: 1500W
- Rice Cooker:
  Power: 700W
- Mobile Phone Chargers (assuming 10W each):
  Number of chargers: 2
  Total power = 20W
- Mini Hot Plate:
  Power: 500W

Total Daily Power Consumption:

We'll assume the following usage pattern:

- Ceiling lamps: 4 hours/day
- Outdoor garden lamps: 3 hours/day
- Electric kettle: 0.5 hours/day
- Rice cooker: 1 hour/day
- Mobile phone chargers: 2 hours/day
- Mini hot plate: 1 hour/day

Daily Power Consumption Calculation:

- Ceiling lamps: 30W * 4 hours = 120Wh/day
- Outdoor garden lamps: 60W * 3 hours = 270Wh/day
- Electric kettle: 1500W * 0.5 hours = 750Wh/day
- Rice cooker: 700W * 1 hour = 700Wh/day
- Mobile phone chargers: 20W * 2 hours = 40Wh/day
- Mini hot plate: 500W * 1 hour = 500Wh/day

Total Daily Consumption:

- 120Wh+270Wh+750Wh+700Wh+40Wh+500Wh= 2380Wh

Battery Capacity Calculation:

- We are using two 12V batteries in parallel. Now calculate the required battery capacity:

- In this project we are using inverter to get 230v using 12v batteries. Practically inverters are not 100% effective. So, let's assuming our inverter efficiency is 90%, then the actual power needed from the batteries is:
- Total power needed from batteries = 2380Wh/0.90 = 2644Wh

ttery Capacity in Amp-hours (Ah):

Battery Capacity= 2644Wh/12V = 220.33Ah

- So, we are using 12V 220Ah two batteries.
- So, we have total 440Ah we can use half of each battery it increases our batteries lifecycle.

lar Panel Calculation:

- Let's Assume we have 5 hours of sun per day and a solar panel efficiency of around 80% (because most of solar panels in the market have nearly 85% of efficiency).

tal Solar Energy Required per Day: 2644*Wh* (from previous calculations)

quired Power = 2644*Wh* / (5 ×0.85) = 622*W*

- So, we are using two solar panels each 320W.
- In this case we have to consider about the caravan roof dimensions we have length 5m and width 2.2m so we can mount our two solar panels easily because each solar panel has length 1.6m and width of 1m

As out Backup power Source we are using Gasoline current generator. In here we are using 1KW generator because of the weight of generators and 1KW generator can fulfil our power requirement when we use carefully.

Assume that we are using generator for 4 hours

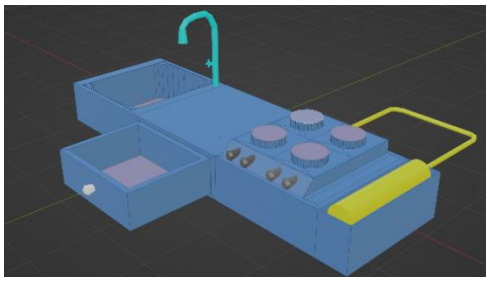
Generator power = 2644Wh / 4h = 661W. also we can use generator to charge our batteries.

Kitchen Unit

- In this project we design a suitable kitchen for the caravan. Several aspects had to be considered while designing this. Such as space optimization, safety and durability.

- When designing a kitchen, that have two main parts.

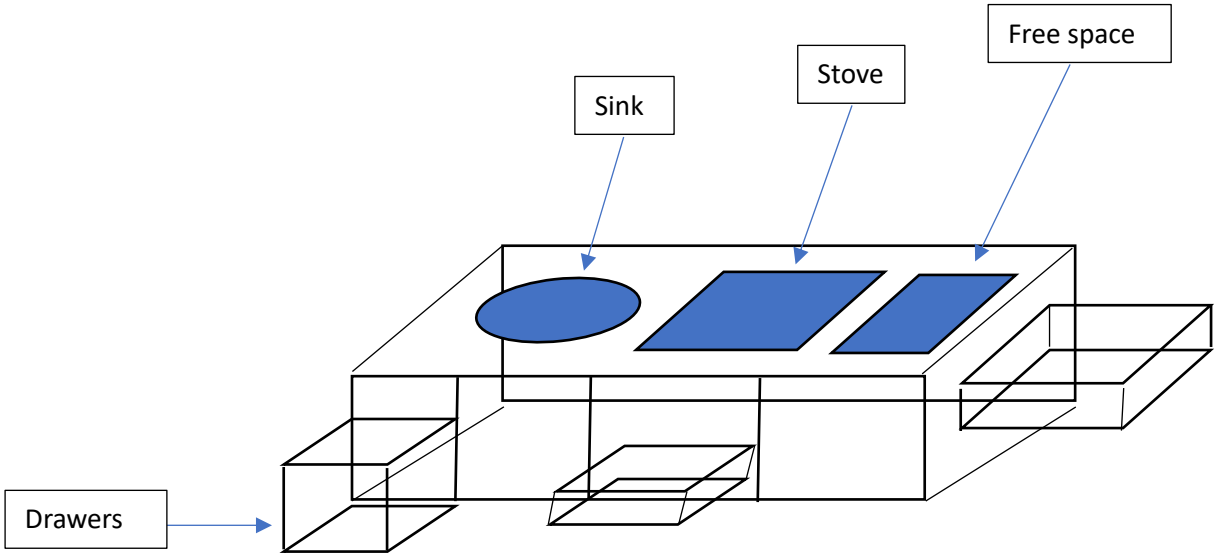
- Sliding kitchen unit.



- Pantry cupboard.

- The specialty of the sliding kitchen unit is that it can be used outside or inside the caravan, and it can be stored in a small amount of space to manage space.

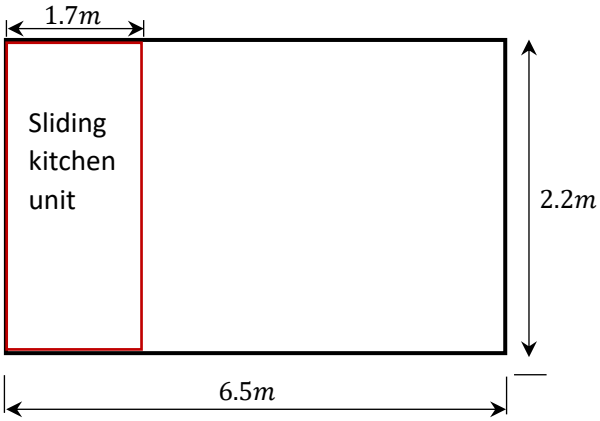
- To meet those requirements, space management methods were searched and a suitable new method was designed.



- While creating this , its strength as well as lightness should be taken into consideration and although 2mm metal sheets are suitable as raw material for this . I expected to use 3mm card board for our model creation. It is expected to use silicone to assemble these.

- Here the plan related to the sliding kitchen unit is completely prepared and all that needs to be done is to arrange the parts accordingly and assemble them. For that, the body part of the caravan should be finished. The reason is that measurement related problems that may occur in practice are minimized and if there are elements that need to be updated, they have to be redesigned.

- However, the kitchen unit measurements are given below.



- Material procured were 3mm thick cardboards.
- We use silicon to assemble these.

Roof

- We focused on user satisfaction by researching traveler needs and issues.
- The roof was planned to design by using Thermal Poly Olefin (TPO), meeting user requirements.
- Size of the roof – 5m x 2.2m

Furniture

One of the primary benefits of a caravan table is its role as a dining table and being able to use the same table as a bed.

It provides a comfortable place for meals, reducing the need to eat in bed or on the floor. In addition, it is a convenient place for food preparation and serving.

We can save space and use the table as a bed.

Foldable Furniture

Importance of well-designed

caravan furniture

- Space optimization
- Multi functionality
- Comfort functionality
- Space optimization

Additional Features

The caravan includes a GPS system for easy navigation, a hydraulic system for smooth operation, and a first aid box for safety. These added features aim to provide tourists with a comfortable, secure, and convenient way to explore Sri Lanka.

- Fordable Roof
- First aid Box
- Tool Box
- Gps system.
- Security system
- Hydraulic System

Conclusion

In conclusion, our project successfully achieved the design of a compact yet functional caravan vehicle tailored for the Sri Lankan tourist industry. With careful planning and allocation of space, we were able to incorporate essential amenities such as a power supply unit, washroom, kitchen, and bedroom within a 5-meter long vehicle. This design aims to offer a comfortable and convenient travel experience for tourists, enhancing their journey through Sri Lanka. We believe this caravan design has the potential to make a positive impact on the tourism sector by providing an innovative accommodation solution.

Group Members

229085	Mr. J.M.P.S.N.Jayasundara
229074	Mr. H.R.S.Imasha
229076	Ms. D.D.A.Isuruni
229077	Mr. J.A.M.T.Jayakody
229078	Mr. S.R. Jayakody
229079	Mr. K.A.L.Jayaminna
229080	Mr. S.A.C.V.Jayampathi
229081	Mr. L.A.H.O.Jayarthna
229082	Mr. K.D.N.M.Jayasanka
229083	Mr. C.N.Jayasekara
229084	Mr. R.D.B.J.Jayasinghe
229086	Ms. V.W.D.G.Jayasundara
229087	Ms. S.M.S.Jayathissa