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Analytical Study of Reuse shipping containers As Residential House

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ABSTRACT: Due to increasing waste generation of shipping containers year to year, the shipping containers can also used for the residency for the people. With cheap And good appearance shipping containers homes can be a good option for lower class people in Country which have more population. In india, with high cost for construction of Concrete made houses as compared to container homes.

In this paper, we have studied about shipping container homes which are actually made. While making paper, we have studied the different literature reviews which helps to understand the container housing. Their comparison to actual RCC made concrete structure also explained.

The methodology explained about visiting sites for practical knowledge, making own planning for container housing, And making the model for better understanding of container housing. Model planning is basically based on actual planning of container housing which taken as scale.

Actual estimation for shipping container housing also explained.

KEYWORDS: Container Housing, Comparison, Actual planning, Etc.

I. INTRODUCTION

New world needs new researches and new development new art of living so the basic contain for making this civilisation therefore we will be moving towards civil engineering industry So the basic content in civil engineering industry or cement send an aggregate due to increasing demand of this content this material is getting costly day by day and less production due to limited natural resources this affects mostly to the pocket of middle and lower class people While making cement the generation of CO₂ gas is getting higher day by day due to the more demand therefore it will affect the environment and the workers who work in that environment.

And break is also made by natural clay by excavating the surface of the earth it is said to be about industry affect and consume more energy and natural substances so we can choose it alternative in least count is a shipping container shipping containers are generally made from sheets which are made by corten steel Galvanised steel and aluminium e steel etc other elements. These containers have a size of 1020 and 40 feet which are used in importing and exporting goods and materials from one country to another these containers can be transported by Roadway waterways and airway waterways are generally used to transport the container from one country to another While designing this are designed in a way that they can suffer harsh climatic condition and rough seas containers had a shipping span of 8 to 10 years and after recycling they can be used in 15 to 20 years span. Containers are basically eco-friendly than concrete made structure.

Now these days people are adopting container housing which is better option for lower class. Lower in budget and better for living for people having four members in family, always be beneficial.

II. COMPARING CONTAINER HOMES TO TRADITIONAL HOMES

While constructing home we always be going with and gives a first priority to costing laid for the construction. sudden incrementation of materials affects the pocket of small type of residential house construction. so therefore it is to be ready to purchasing materials and purchasing a land of area having 300 sq.ft to 600sq.ft this can be neglected if we use a shipping container as replacement of traditional based houses but in least count

Some points to be consider while comparing

1) Construction cost

Construction cost for traditional homes to get more as compared to container homes

Purchasing a land having area of 300 sqft could be cost 3 lakhs rupees by the rate of 1000rs/sqft

Building a foundation at the rate of 500 which costs upto $300 \times 500 = 1,50,000$ rs along with constructing a rcc and brickwork also costs of $300 \times 1200 = 3,60,000$.

Estimating all these contents making a estimate of $(Rs.3,00,000+Rs.1,50,000+Rs.3,60,000) = 8,50,000$ rs. These can be construct an alternative solution is shipping container home which costs rs 3,00,000- 4,00,000 economically.

2) durability

Comparing container homrs to traditional homrs, there is no doubt concrete made strucrue are more durable than metal made strucrues, but containers are designed in waay that they can bear heavy loads and the reason is metal used which is corten steel. This metal also least affective to corrosion

3) maintenance

There is a low maintenance for rcc made strcture than container made homes because loss of actual strength and atmospheric condition to be faced affects the container.corrosion is the main reason to container housing and this can be solved by applying non corroded paints and solvents.

4) architectural purpose

It is too easy to giving a architectural shape to a container housing comparing to traditional concrete made structure. Containers can be modify and giving desireable shape. While tradition homrs can be giving architectural design at once.

5) Transportation

It is easy to be transported shipping container homes to one place to another place and

It is not possible the transportation of tradtional homes.

III. LITERATURE REVIEW

During our study on various literatures we have studied many things about Grey Water Management, Its Recycle & Reuse, Hydroponic Farming, Methods, Uses, Benefits, Design Composition, etc.

1) Design and analysis of Shipping Container using STAD- PRO

It is observed that any proposed design responds to new challenges such as (low energy use, construction particle etc.) can be analysed.Containers can be created easily and relatively in too budget within short time in addition to flexibility and possibility on sites.This paper also shows that calculation of structural projects with construction system by using resources available.

2) Thermal performance assessment of shipping Container.-In this paper to check thermal performance of shipping container, building energy modelling is done. BEM is the branch which examines use of energy and indoor condition of a structure.In BEM, parameters of interest are physical appearance, metal properties are taken into consideration.Second thing which can be done for thermal insulation is providing layers of foam insulations on walls and ceilings. Also, it is necessary to check structureorientation and window properties for thermal comfort.it is observed that having glazed windows schedule natural ventilation and increased door temperature and humidity.

3) Shipping Container market – resistance market.

The global shipping container market gives positive response and growth trend since 2012.Valuation of GSC in 2016was US \$ 4600 this could be more than US \$ 8N by end of 2025.20ft segment was mostly used.Container product type: - Dry, Tank, Offshore, Reefer.

4) Thermal performance assessment of shipping Container in hot and humid climate.”Most of steel containers are made from weathering steel or Corten steel which ensures high corrosion resistance. Using different roofing such as double roofing which can act as thermal insulation or reflective painted shed, hip or gable roofing.Insulation in roof and wall: - insulating the grass into the roof, double roofing, solar energy panel, straw bale walls.Internal insulation: - spray foam (Styrofoam), insulation blankets, mud bricks.

5) Refurbished shipping Containers as architectural module in Bandung.”Standards and regulations of shipping industry creates a robust,durable,and modular shipping container.Properties create a big opportunity for adaptive reuse and attempts to reuse those containers, not only reduce the pile- Shipping containers have a big potential to be reused as these containers in terms of heat insulation.Reducing heat gain inside the building.Cover surrounding the building reduce the amount of heat. In this study case however, recorded temperature was only helpful to see the whole condition throughout various Energy consumption to transport containers from embodied energy a refurbished container building have.

6) “Feasibility of using ISO Shipping Container to build low-cost house in Malaysia.”The research aimed to produce a base point study for using used ISO shipping container as structural building application in Malaysia. There is not much literature publicly discuss on the development of container house as low-cost house in Malaysia.The development of container house in Malaysia is partially recommended as there are 45% of Malaysian citizen can accept the idea of living inside a container house and all the four companies rated 50% trust in the development of container house in Malaysia. As recommendation, future research should also investigate the perception of government sector about the feasible development of container house in Malaysia.

IV. METHODOLOGY

1) Site Visit: We have visited a site at Pipla Fata nearHudkeshwarrd, Nagpur, where we met to Mr. Rajesh Desai the site engineerhe told us how they modified the shippingcontainer according to their use for storage room and office cabin. The shipping container is of dimension 40 x 8 x 8ft. they had made a partition of container with blockboards one is used for office cabin and another one is used for storing mechanical tools and testing materials. They had used plywood and thermocole sheets for insulation they told us that it works effectively in summer as the temperature goes upto 42 degrees but in this container they did not feel much heat. The container is provided with 1 door for entry and exit,4 windows for proper air circulation and a ventilator.



Fig. 01:At Hudkeshwar corner
(Exterior)



Fig. 02:At Hudkeshwar corner
(Interior)

This are the actual site visit photos where we have visited and in this the container was used to modify for the office purpose and making a liveable space for the workers.

2) Model Planning: After visiting too many sites we and getting all the details of the normal container and container available in our region, we started to opt for different plans that are suitable for the regional areas like Nagpur

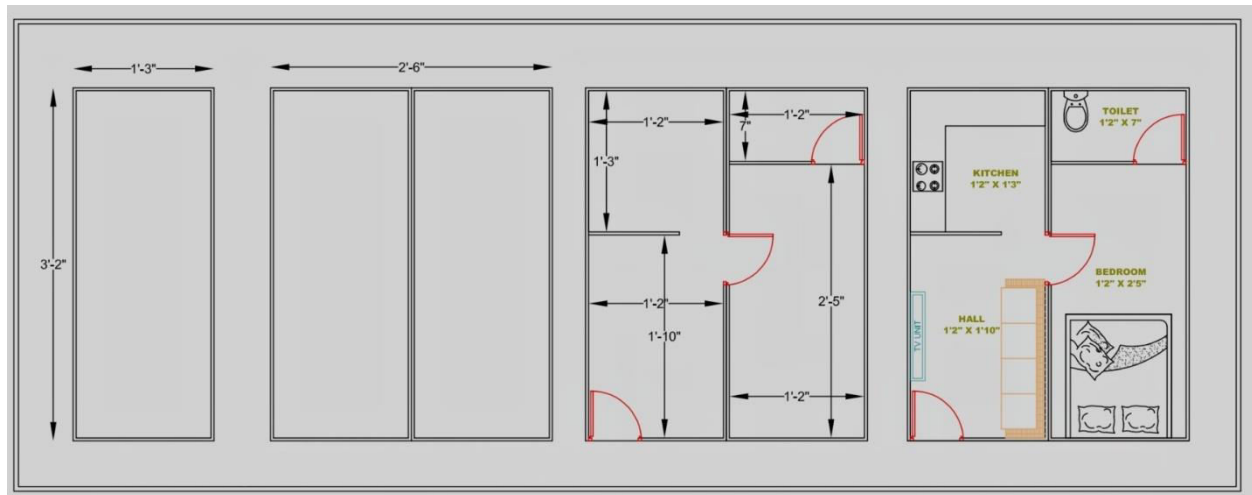


Fig 03: Typical Plan for the model



Fig 04. 3D model of planning

- As we got the dimension as 20 feet by 8 feet and 40 feet by 8 feet but the longitudinal 40 feet container would be difficult to move around the city and the planning would not be suitable for the Indian standard living .
- Hence we decided to have 2 container of size 20 feet by 8 feet joining them by side of 20 feet and forming a area of around 20 feet by (8+8) 16 feet = 360 sqft area for better planning of 1BHK home.
- We divided the the container in two parts in one container we planned drawing room and kitchen and in another section we planned bedroom and toilet with suitable cross ventilation and door fixing.
- We turned the dimension of real plan into the scale of 1:6 and planned it according to the the actual model sizes
- The plan was sketched on Auto-CAD and later on a 3D plan with help of 3dmax was also drafted .
- This helped us in getting the interior and exterior views of the model .

3) Model making: Now after the planning we have going with next step which is material which are laid for model making.

- The GS sheets are used for Structure of model.
- Then for Interior work, thermocoating sheets are placing at each wall of model.
- Proper partion provided as per given dimensions.
- Proper placement of furnishing and applying paints.



Fig 05: Model Structure



Fig 06: Interior Work of model

V. ACTUAL ESTIMATION OF CONTAINER HOUSING

The estimation for the container housing shows the material to be needed and their cost.

The following dimensions are taking for container housing as per model planning.

The dimension of rooms as follows.

- Drawing room – 7'8" X 11'6"
- Kitchen – 7'8" X 8'
- Bedroom – 7'8" X 15'6"
- Bath/toi – 7'8" X 4'

Shipping Container Home	
Size- 20ft x 16ft	
Specification	Rs/pc=total
GI portable home cabin (without Paneling)	Rs.1,55,000 x 2 = 3,10,000
Including 1nos Main Door with hydraulic Door closer, 2nos sliding Aluminum window with M.S grill, 4nos cabin Fan, 3nos LED Tube light, Roof outside of G.I sheet, False Ceiling 4mm ACP sheet, Insulation of Glass wool density of 16kg/m ³ , Wiring of PVC insulated Copper wire, earthing point provided, Legs of 6inch height 4 legs at all four corners, specially formed hooks for easy lifting and shifting, all components paint by 2 coat epoxy after one coat of primer	
Partitions (full)	10,000
Inbuilt toilet cum bath 7.8 x 4	35,000
Open pantry L shape 7.8 x 8	45,000
Installations	30,000
Total	Rs.4,30,000

IN WORDS: FOUR LACK THIRTY THOUSAND RUPEES ONLY.

VI. CONCLUSION

From all the research done it has found that the Shipping containers are better for liveable with low maintenance and are helpful for the lower class people. Detail studying and making model helps us to proper adjustment of rooms and actual container housing look like. Model making is by the scale of 1:6 as per the actual dimensions of the container housing.



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