IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

REVIEW PAPER ON COMPARATIVE STUDY BETWEEN LGSF BUILDING AND CONVENTIONAL BUILDING

[1]Yawar Hussain, [2]Harshdeep
[1]M. Tech scholar, [2]Associate Professor
[1]Departement Of Civil Engineering
[1]RIMT University, Mandi Gobindgarh, Punjab, India

ABSTRACT

In present scenario it is preferable for any construction project to complete in minimum time and in estimated budget without compromising the strength and durability of building. construction business is always changing and looking for effective and new building methods to deal with the problems of durability, cost-effectiveness, and sustainability. By examining many factors such as structural integrity, construction time, energy efficiency, and environmental effect, this research compares the performance of Light Gauge Steel Frame (LGSF) structures with conventional buildings. The growth rate of population is very high in India so we need some smart solution to meet the demand of buildings, as the technique of building construction like (RCC and Brick) is so much time consuming now a days. The objective is to study the various components involved in smart solution for building construction and reduce the construction time as well as the cost. In addition, as the research methodology of this research, we have collected the relatable data from various sources. After the collection of data, we analysed this data and find out the major aspects and factors which are responsible for increasing the project cost. The research shows that LGSF buildings have the potential to provide better structural performance, quicker construction times, better energy efficiency, and lower environmental impact. The results of this research show that LGSF buildings have a number of benefits over traditional Building.

Keywords: Comparative study between LGSF and RCC, Time reduction in construction, Cost control.

1. INTRODUCTION

The construction sector is essential to meet the growing demand for sustainable and efficient structures. In recent years, alternative construction systems that offer better performance, faster construction, better energy efficiency and reduce environmental impact have gained popularity. One such option is the Light gauge Steel Frame (LGSF)construction system, which uses cold-formed steel profiles as the main structural components. On the other hand, traditional construction methods have dominated the construction industry for a long time. Reinforced concrete or wood are often used as the main structural components of these systems. However, traditional construction techniques often have several disadvantages, such as longer construction schedules, higher prices and less freedom in design. This study compares the performance of traditional buildings with LGSF buildings to assess how well each performs in several locations. We aim to provide comprehensive information on the benefits and limitations of each building system, comparing structural integrity, construction time, energy efficiency and environmental impact. The ability of the LGSF construction system to overcome the shortcomings of traditional construction techniques has attracted attention. LGSF structures offer faster assembly times, lower labour costs and greater design freedom by using lightweight steel frame components fabricated externally. Additionally, due to the inherent strength and length of steel, LGSF structures can withstand seismic pressure and adverse weather conditions. A key component of sustainable building design is energy efficiency. LGSF buildings often use effective insulation methods that improve thermal efficiency and reduce heating and cooling energy costs. In addition, the use of recycled steel in LGSF construction results in less environmental impact than the use of traditional building materials. This comparative study uses a literature review, case studies and data analysis. The results of this study provide important new information about the functionality of LGSF structures and their potential as an alternative to traditional building systems. Compared to other materials such as wood and concrete, cold formed steel parts can offer the following advantages:

- Quick and easy installation and erection
- High strength, stiffness and lightness
- Easy mass production and prefabrication
- Efficient handling and transportation
- Waste generated can be easily recycled

Light steel framing is a construction technique that uses cold-formed steel as a construction material. It can be used for roof systems, floor systems, wall systems, ceiling panels, decks or entire buildings. They can also be used as individual framing elements such as studs, beams, headers and trusses. Light steel frame parts can also serve as both main and side structures. An example of a light steel frame used as primary structures is strip steel trusses. Steel studs act as secondary structures providing lateral support to the exterior wall finish while resting on the primary structure. Light Gauge Steel Framing (LGSF) buildings can be used as a substitute for RCC/conventional buildings. It is used to create frames for exterior walls, floors, interior walls, etc. They are used as a base on which suitable tiles and materials are used to cover the frame. LGSF buildings look similar to conventional RCC buildings after completion.

2. LITERATURE REVIEW

2.1 GENERAL

Light Gauge Steel Frame Construction concludes to be an economic alternative compare to other conventional construction material and techniques due to multiple reasons as the overall weight of the structure is comparatively lighter, also due to the fast pace of construction the cost involved in renting machines and other operations also reduce. Other than all these parameters, due to the highly precise manufacturing of the building elements almost no mismatches are observed on sites resulting precise assembly of elements on any remote sit. These literature reviews provide comprehensive insights into various aspects of LGSF buildings compared to conventional buildings, including thermal performance, fire resistance, acoustic comfort, seismic retrofitting, and environmental impact. They contribute to a deeper understanding of the advantages and challenges associated with LGSF construction, helping inform decision-making in the construction industry towards more sustainable and resilient building practices.

2.2 LITERATURE STUDY AND REFERENCES

Chavan, Desai (2017), Describe how using prefabrication in a project can reduce the time required to complete it. This indicates that it takes less time for the target to affect the immediate area. Using this prefabricated construction component, construction projects can reduce critical curing times and eliminate the need for intermediate forms. Using elements building components we can reduce costs up to 17.24% and project duration up to 26% using the method. Prefab construction techniques allow us to quickly and cheaply complete the tasks required by the construction industry. Prefab construction is found to require much less time than conventional construction. Panel construction produces higher quality components than on-site construction.

Gohil et al (2018) This study compares LGSF and conventional reinforced concrete frame (RCF) building systems in terms of construction time, cost, and environmental impact. Findings suggest that LGSF buildings have shorter construction time and lower environmental impact due to the use of steel, although initial costs may be higher.

Alia O. M. Ahmed and Nigel d. P. Barltrop (2017) in this paper they presented the seismic performance of LGFS structure, these structures are very good under seismic forces. Seismic forces or earthquakes are very important factors that are considered in the construction design of a structure. Steel frame and thin steel subjected to lateral loading can use portal frame air shear panels, so the result must be proved how to absorbs the seismic forces due to bending. Another study was conducted on the selection of cold-formed steel and steel components.

Doctolero, batikha, (2018) compares the use of three different materials in a four-story office building: cold-formed steel sections (CFSS), reinforced concrete (RC) and hot-rolled steel sections (HRSS). Using linear elasticity analysis, the main structural elements of each structure were created according to BS standards and Euro standards. Design observations were made and many results were obtained regarding construction mass, material cost, total construction cost (material cost plus construction cost) and construction duration. The results show that compared to reinforced concrete (RCC) and hot rolled steel, the use of cold-formed steel sections (CFSS) in medium buildings provides significant material and construction costs, as well as significant time. savings during construction (HRS). Buildings made from cold formed parts are67% lighter than RC parts. CFS is 34% cheaper than RC construction in terms of material costs. If RC structures are built instead of CFS, construction cost scan increase by an additional 85%. Compared to the RC structure, CFS saves a total of 61 percent in both construction costs and material costs. RC was found to take more build time than CFS, up to 164 percent less. The total cost and construction time index shows that CFS offers more cost benefits than RC

Satpute, Varghese, (2012), Considering that almost all parts are machine cut, check how to ensure compatibility of all structural parts and accessories for cold formed parts. One of the main advantages of the cold-formed building \technique is that, only bolted connections are used, the building can be dismantled, stored or moved before being rebuilt. The rigid construction is durable and has no external welding or riveting. By using the cold forming system, efficiency is achieved along with quick completion of the project. Industrial buildings made foot-rolled steel and cold-formed steel were also compared, and the results showed that the material and construction costs of cold-rolled steel industrial buildings were lower than hot-rolled steel industrial buildings. In traditional buildings, these factors were greater. Materials and savings were about 25%.

Alhalabi Zinah Shuman (2018) LGFSs are environmentally friendly due to durability, recyclability and low construction site waste. One of the most important key factors is cost reduction and flexibility for non-profit walls. As the population grows exponentially, it is vital to meet construction needs, especially residential and commercial or mixed-use high-rise buildings.

3. METHODOLOGY

This study was conducted to determine the advantages of LGSF over RCC structures. All aspects of the LGSF system are explored. The method of data collection is secondary data collection. All information is gathered from previously conducted studies in paper or construction magazines and books. We would also use some data published by central government. Authorities like BMTPC, CPWD publication and state government released the information. The collected data can be used directly in this paper or, if necessary, we will make calculations based on the data. Regarding my topic, we need to do a comparative analysis based on the collected data. The information in this document is both quantitative and qualitative. In addition to data processing, collected data is processed using calculators such as MS Excel.

Four models were considered for this study. One is built using steel as the building material, which can be either a concrete column or a steel column to support the truss, and the other is built using a light steel frame building material, which can be either a concrete column or a Light Gauge steel column to support the grid Steel warehouse shed and LGSF warehouse shed are planned and analysed using STAAD pro software. Both structures have the same dimensions under similar loading and reactions such as deflections and lateral should be recorded. Apart from that, a cost analysis is also done for all the four models. The total cost of the structure depends on three different parts of the structure:

- Material of truss
- Material of column
- Material of end wall covering

Possible combinations are described by the flowchart below.

3.1 STUDY AREA

The project selected for the study is a shri amaranth shrine board dormitory project located in CHANDERKOTE JAMMU. Research is done on various topics, such as: the relationship between time and cost, labour productivity, material selection. Comparative analysis of different materials, alternative construction methods are the main factors considered as the research area of this study.

Project: shri amaranth shrine board dormitory.

Construction area: 180 square meters.

Location: Jammu.

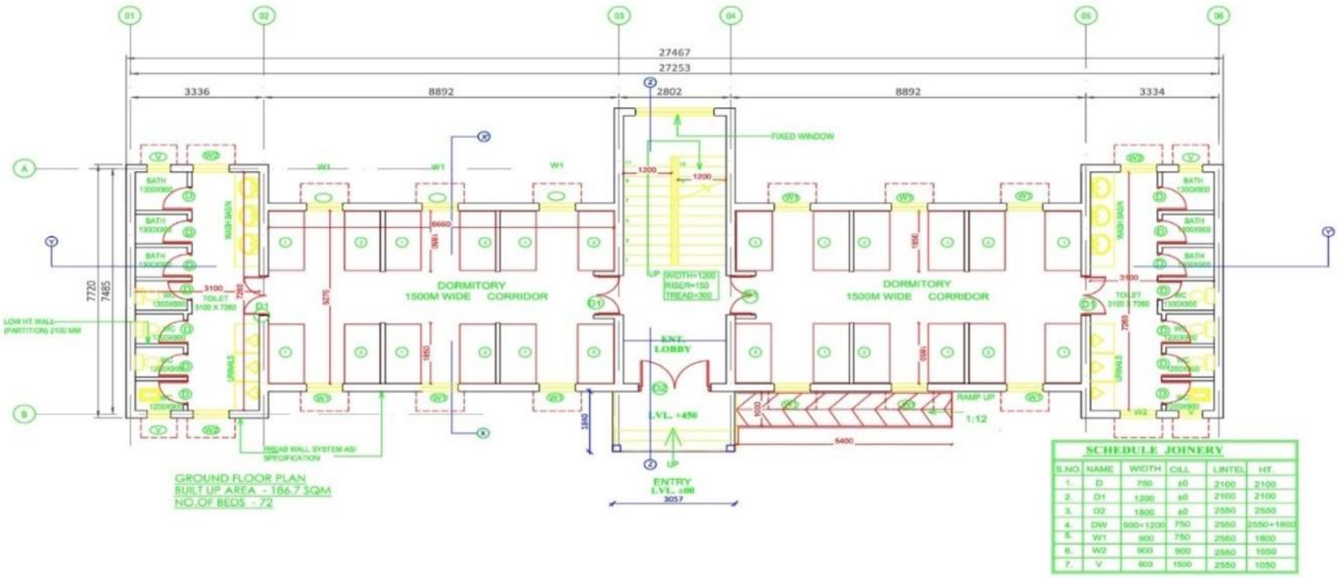

Figure 3.1 floor plan of LGSF structure

RCC structure item wise quantity and cost

Table 3.1.1 general quantification of project RCC and brick structure

S.NO	ITEM	UNIT	QUANTITY	RATE(Rs)	AMOUNT
1	Excavation	Cum	60.92	325	19799
2	P.C.C	Cum	10.15	4800	48720
3	R.C.C	Cum	125	8300	1037500
4	Steel	Kg	17981	98	1762138
5	Shuttering	Sqm	300	400	120000
6	Brickwork	Cum	300	9500	2850000
7	Flooring	Sqm	180	450	81000
8	Ext plaster	Sqm	173	290	50170
9	Int plaster	Sqm	551	230	126730
10	Door frame	Cum	1.21	105000	127050
11	Window frame	Cum	1.32	105000	138600
12	Window shutters	Sqm	36.6	3600	131760
13	Door shutters	Sqm	46.5	3800	176700
14	Wall putty	Sqm	724	130	94120
15	Paint	Sqm	724	90	65160

16	Tiles	Sqm	45.7	1450	66265

Total cost of RCC structure = Rs 68,95,712/=

LGSF structure item wise quantity and cost

Table 3.1.2 general quantification of project LGSF structure

S.NO	ITEM	UNITS	QUANTITY	RATE(Rs)	AMOUNT
1	Excavation	Cum	60.92	325	19799
2	P.C.C	Cum	10.15	4800	48720
3	R.C.C	Cum	125	8300	1037500
4	LGSF steel	Kg	9350	128	1196800
5	Steel	Kg	17981	98	1762138
6	Shuttering	Sqm	300	400	120000
7	Flooring	Sqm	180	450	81000
8	Gypsum board 12.5mm	No.	81	480	38880
9	9mm Ext FCB	No.	59	1250	73750
10	6mm Ext FCB	No.	59	620	36580
11	9mm Int FCB	No.	186	1250	232500
12	6mm Int FCB	No.	186	620	115320
13	Door frame	Cum	1.21	105000	127050
14	Window frame	Cum	1.32	105000	138600
15	Door shutters	Sqm	46.5	3800	176700
16	Window shutters	Sqm	36.6	3600	131700
17	Glass wool	Sqm	440	145	63800
18	Tiles	Sqm	45.7	1450	66265
19	Wall putty	Sqm	724	130	94120
20	Paint	Sqm	724	90	65160
21	Connectors	Lumpsum	-	-	150000

Total cost of LGSF structure = Rs 57,76,382/=
Cost difference = Rs 68,95,712 - Rs 57,76,382 = 11,19,330/=

3.2 FLOW CHART

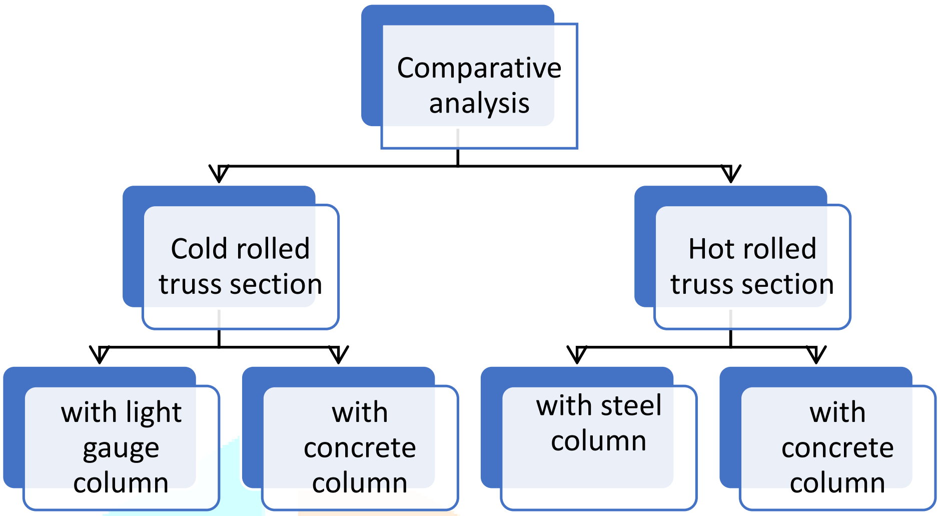

Figure 3.2.1 possible models under consideration

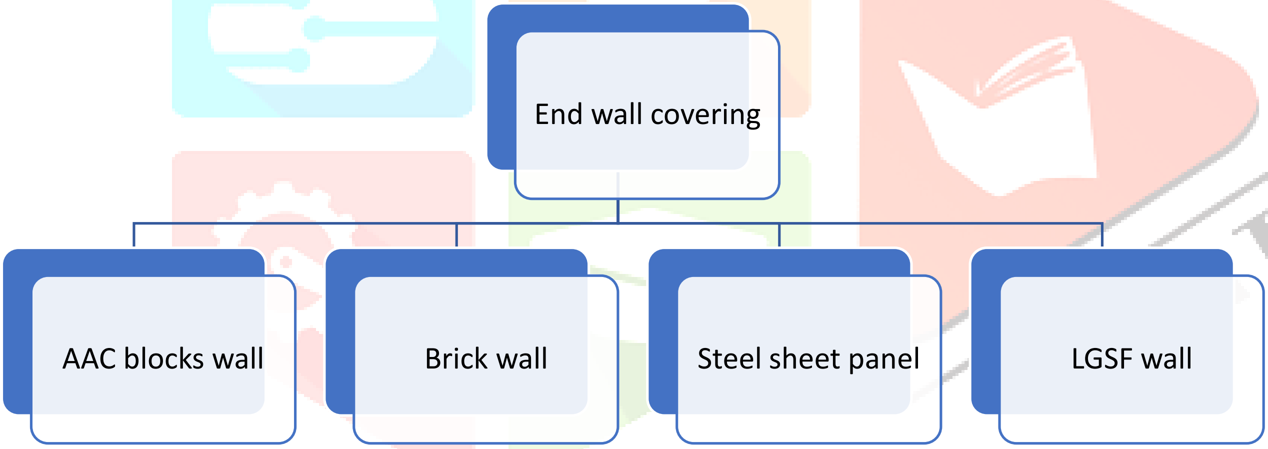

Figure 3.2.2 end wall covering under consideration

3.3 STRUCTURAL MODELLING

The model under consideration is a warehouse of cover area 16m X 30m with a height of 5m and apex height of 2m additional at mid causing the overall height of the structure at middle to be 7m. The span at the entry of the structure is 8m for easy loading and other important requirements of a warehouse are shown in table below. Span along the length is 5m. 200mm of overhang roofing material is provided.

Table 3.3 details of all dimension of the model under consideration

S.NO	PARAMETER	DIMENSION
1	Length	30m
2	Width	16m
3	Height	5m
4	Span along length	5m
5	Span along width	8m
6	King post height	2m
7	Slant height	8.24m
8	Overhang roof	0.2m
9	Concrete column	0.300m x 0.300m

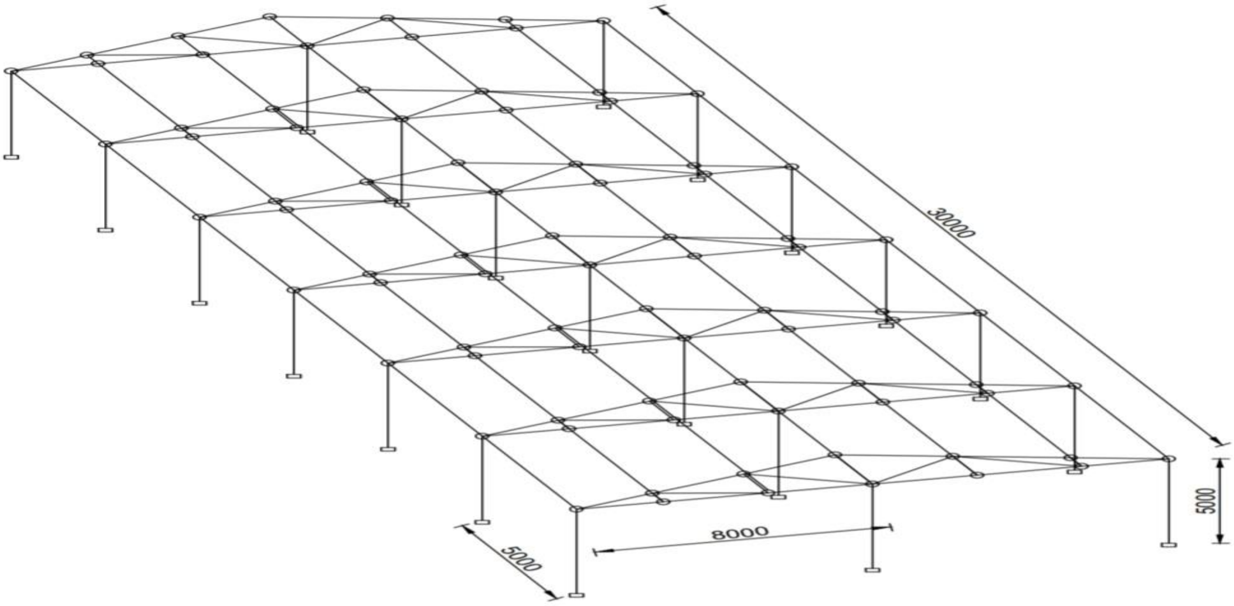

Figure 3.3 designed model of the warehouse under consideration

3.4 QUANTITY ANALYSIS

Quantities that are actually being used in the design of the structure are being discussed below:

3.4.1 Clay bricks and AAC blocks as end wall covering

Total area of wall = 492 m^2
Size of brick with mortar = 200x100x100mm
Volume of wall = 492 x 0.23 = 113.16 m^3
Size of AAC block = 200x600x230mm
No. of bricks in 1 m^3 = 500 brick
No. of AAC blocks in 1 m^3 = 36 block
Total bricks required in model = 113.16 x 500 = 56580 no.
Total AAC blocks required in model = 113.16 x 36 = 4073 no.
Nominal size of brick with mortar = 20x10x10cm
No. of bricks in 1 m^3 = 500 brick
Standard size of brick without mortar = 19x9x9cm
Actual volume of 500 bricks = 500x19x9x9x10^6 = 0.77 m^3
Volume of mortar = 1 – 0.77 = 0.23 m^3
Add 10% wastage = 0.23 + 0.23 x 10% = 0.253 m^3
Volume of wet mortar = 0.253 + 0.253 x 25% = 0.32 m^3 (dry volume < wet volume)
Ratio of cement mortar = 1 :4
Volume of cement = 0.32/5 = 0.064 m^3
Volume of sand = 0.32 x 4/5 = 0.256 m^3
Density of cement = 1440 kg/m^3
No of cement bags needed for 1 m^3 brick work = 0.32 x 1/5 x1440/50 = 1.84 bags
Actual volume of 36 AAC blocks without mortar = 36x0.19x0.59x0.22 = 0.87 m^3
Volume of mortar for AAC blocks = 1 – 0.87 = 0.13 m^3
Add 10% wastage = 0.147 m^3
Volume of wet mortar for AAC blocks = 0.147 + 0.147 x 25% = 0.183 m^3
No of cement bags needed = 0.183 x 1/5 x 1440/50 = 1.05 bags
Volume of sand = 0.183 x 4/5 = 0.146 m^3

Table 3.4.1 several parameters of for 1m^3 brick work

S.NO.	PARAMETER	CLAY BRICKS	AAC BLOCKS
1	Size	200x100x100mm	200x600x230mm
2	No of bricks/blocks per m^3	500	36
3	Quantity of mortar	0.23 m^3	0.13 m^3
4	No of cement bags	1.84	1.05
5	Quantity of sand	0.256 m^3	0.146 m^3

Table 3.4.2 cost of individual material

S.NO	ITEM	UNIT	COST(Rs)
1	Cement	Bag	420
2	Sand	CFT	72
3	Clay bricks	No.	10
4	AAC blocks	No.	83
5	Steel sheet	Kg	86
6	LGSF steel	kg	105

4. RESULT AND DISCUSSION

4.1 GENERAL

- In this study, four models with the same structural configuration but with different construction materials were analysed.
- The results obtained in this way are presented in this chapter as tables and graphs in all cases.

4.2 COST ANALYSIS

The cost evaluation of all four-end wall bearing considerations are:

End wall bearing using AAC (autoclaved aerated concrete) Blocks:

Total volume of AAC block work = 113.16 m^3
Cement required for 1m^3 = 1.05 bags
Total cement required = 113.16 x 1.05 = 118.8 bags
Sand required for 1 m^3 = 0.146 m^3
Total sand required = 113.16 x 0.146 = 16.5 m^3
AAC blocks in 1 m3 = 36 block
Total no of blocks required = 113.16 x 36 = 4073

Table 4.2.1 total quantity of AAC block and their cost in the structure proposed

S.NO.	ITEM	QUANTITY	UNIT	RATE(Rs)	TOTAL COST(Rs)
1	Cement	118.8	Bag	420	49896
2	Sand	583	CFT	72	41976
3	AAC block	4073	No.	83	338059
Total cost (Rs)					**429931**

End wall bearing using fired clay bricks:

Total volume of brick work = 113.16 m^3
Cement required for 1m^3 = 1.84 bags
Total cement required = 113.16 x 1.84 = 208.2 bags
Sand required for 1 m^3 = 0.256 m^3
Total sand required = 113.16 x 0.256 = 28.96 m^3
Clay bricks in 1 m3 = 500
Total no of bricks required = 113.16 x 500 = 56580

Table 4.2.2 total quantity of clay bricks and their cost in the structure proposed

S.NO.	ITEM	QUANTITY	UNIT	RATE(Rs)	TOTAL COST(Rs)
1	Cement	208.2	Bag	420	87444
2	Sand	1023	CFT	72	73650
3	Bricks	56580	No.	10	565800
Total cost					**726900**

End wall bearing using steel sheet:

Total area to be covered by sheet = 492 m^2

Panel steel sheet gauge no. = 28 (0.6mm thickness)

Total weight of panel steel sheet = 492 x 0.6/1000 x 7850 = 2317kg

Rate of panel steel sheet per kg = Rs 86

Fabrication cost per square meter = Rs 140

Table 4.2.3 total quantity of steel sheet and their cost in the structure proposed

S.NO.	ITEM	QUANTITY	UNIT	RATE(Rs)	TOTAL COST(Rs)
1	Steel sheet	2317	Kg	86	199262
2	Fabrication	640	m^2	140	89600
Total cost					**288862**

End wall bearing using light gauge steel frame steel:

Total floor area to be covered by warehouse shed = 492 m^2

LGSF steel per square metre = 15kg

Total weight of LGSF steel required = 492 x 15 = 7380kg

Fabrication cost per kg = Rs 8

Table 4.2.4 total quantity of LGSF steel and their cost in the structure proposed

S.NO	ITEM	QUANTITY	UNIT	RATE(Rs)	TOTAL COST(Rs)
1	LGSF steel	7380	Kg	105	774900
2	Fabrication	7380	kg	8	59040
Total cost					**833940**

Table 4.2.5 cost comparison of all four-end wall covers

S.NO.	MODEL	TOTAL COST(Rs)
1	Clay bricks	726900
2	AAC blocks	429931
3	Steel sheet	288862
4	LGSF steel	833940

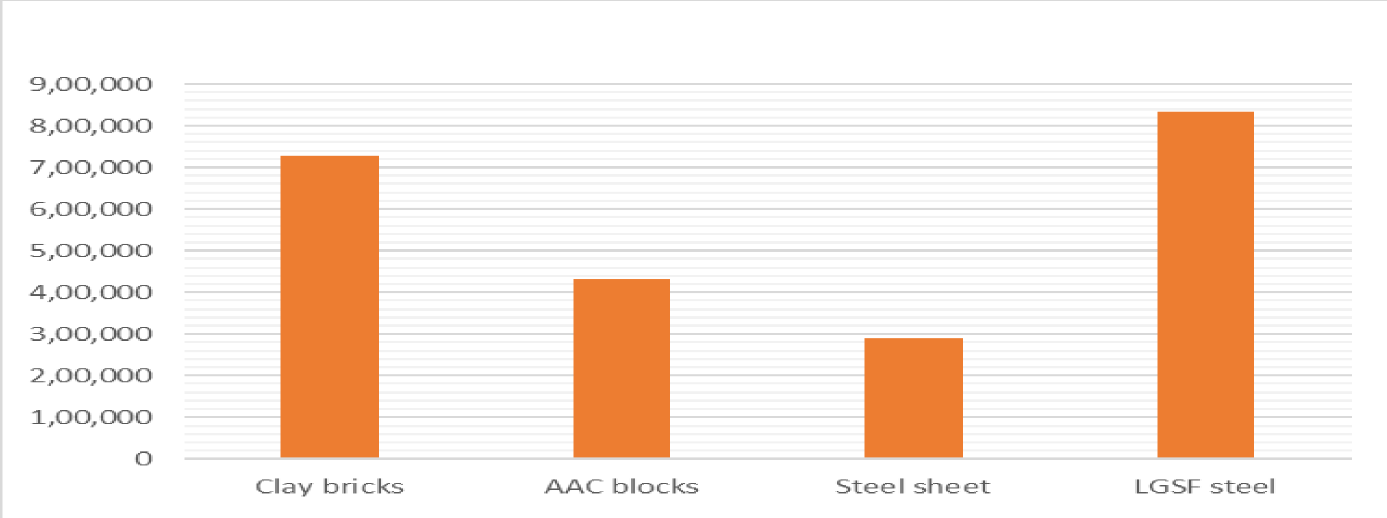

Figure 4.1 Graph Showing Comparison of Cost for All Four End Wall Coverings

4.3 C0ST ANALYSIS OF HOT ROLLED STEEL SECTION USED IN DESIGN OF TRUSS

Table 4.3.1 steel section used in the design of steel structure with their dimension

S.NO.	SECTION	LENGTH	WEIGHT PER METER	TOTAL WEIGHT(Kg)
1	ISMB 200X100X10mm	105m	24.2kg	2541 kg
2	ISMB 100x100x7mm	60m	8.9 kg	534 kg
3	ISLC 75x40x3mm	360m	3.65 kg	1314 kg
4	ISA 90x90x10mm	112m	13.5 kg	1512 kg
5	ISA 90x90x8mm	115.36m	11 kg	1269 kg
6	ISA 90x90x6mm	56m	8.2 kg	459 kg
7	ISA 90x90x6mm	41.72m	8.2 kg	342 kg
8	ISA 90x90x6mm	38.47m	8.2 kg	315 kg
Total weight				**81.28KN**

4.4 C0ST ANALYSIS OF LGSF STEEL SECTION USED IN DESIGN OF TRUSS

Table 4.3.2 LGSF steel section used in the design of steel structure with their dimension to bear same loading condition

S.NO.	SECTION	LENGTH	WEIGHT PER METER	TOTAL WEIGHT(Kg)
1	200CS50X5mm	105m	12.6 Kg	1323 Kg
2	100CS 100x5mm	60m	12.6 Kg	756 Kg
3	90CS 40x3.6mm	360m	2.41 Kg	868 Kg
4	90CS 50x3.15mm	112m	5.24 Kg	587 Kg
5	90CS 50x2mm	115.36m	3.3 Kg	381 Kg
6	90CS 50x1.6mm	56m	2.66 Kg	149 Kg
7	90CS 50x1.6mm	41.72m	2.66 Kg	111 Kg
8	90CS 50x1.6mm	38.47m	2.66 Kg	102 Kg

Total weight	41.95KN

Table 4.3.3 total weight of the structure designed

S.NO.	COMPONENT	WEIGHT (KN)	WEIGHT (Kg)
1	Steel truss	56.36	5745
2	Steel column	24.92	2541
3	Total steel structure	81.28	8286
4	Light gauge steel frame truss	28.98	2954
5	Light gauge column	12.97	1323
6	Total light gauge steel frame structure	41.95	4277
7	Concrete column	231.76	23625
8	Steel truss with concrete column	288.12	29370
9	LGSF truss with concrete column	260.74	26579

4.5 COST OF ALL FOUR MODELS:

a. Total steel structure

Total weight of steel structure = 8286 Kg
Rate of steel per Kg = Rs 72
Total cost of steel structure = Rs 5,96,592

b. Complete light gauge steel frame structure

Total weight of LGSF steel structure = 4277 Kg
Rate of steel per Kg = Rs 115
Total cost of steel structure = Rs 4,91,855

c. Steel truss with concrete column

Total weight of steel truss = 5745 Kg
Rate of steel per Kg = Rs 72
Total cost of steel structure = Rs 4,13,640
Total weight of concrete use= 23625 Kg
Rate of concrete per Kg = Rs 7
Total cost of concrete = Rs 1,65,375
Total cost of steel truss with concrete column = Rs 5,79,015

d. LGSF truss with concrete column

Total weight of LGSF truss = 2954 Kg
Rate of LGSF per Kg = Rs 115
Total cost of LGSF truss = Rs 3,39,710
Total weight of concrete use= 23625 Kg
Rate of concrete per Kg = Rs 7
Total cost of concrete = Rs 1,65,375
Total cost of LGSF truss with concrete column = Rs 5,05,085

Table 4.5 cost comparison of all four models

S.NO.	MODEL	TOTAL COST (Rs)
1	Steel structure	5,96,592
2	Steel structure with concrete column	5,79,015
3	Complete LGSF structure	4,91,855
4	LGSF structure with concrete column	5,05,085

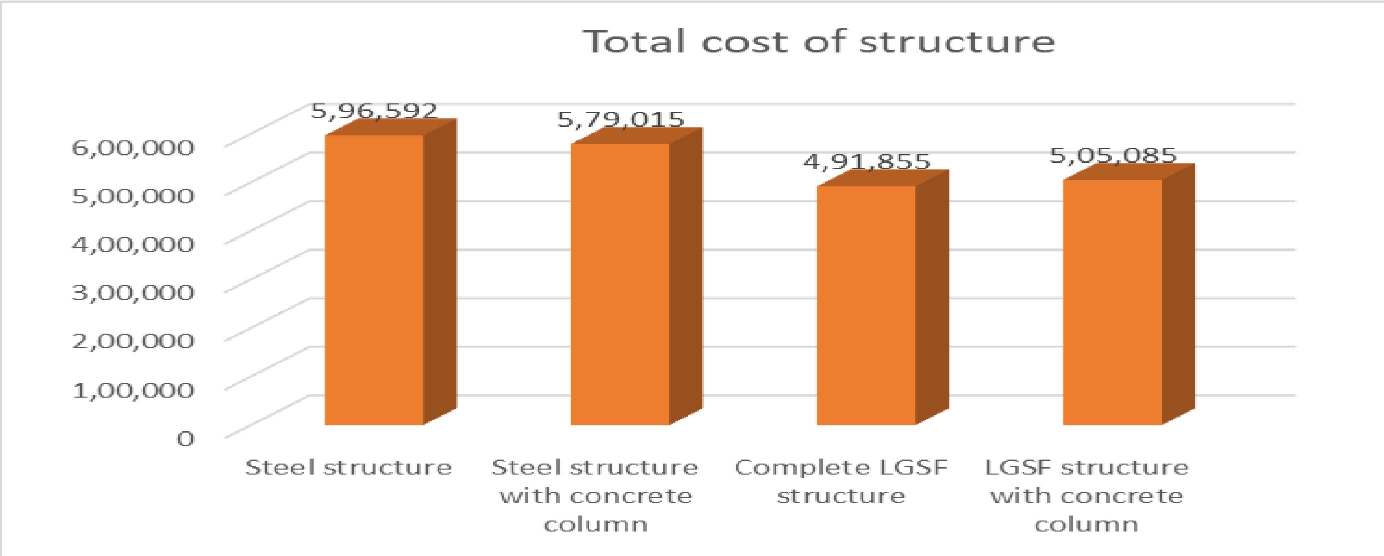

figure 4.5.1 bar chart showing variation in total cost of different structure.

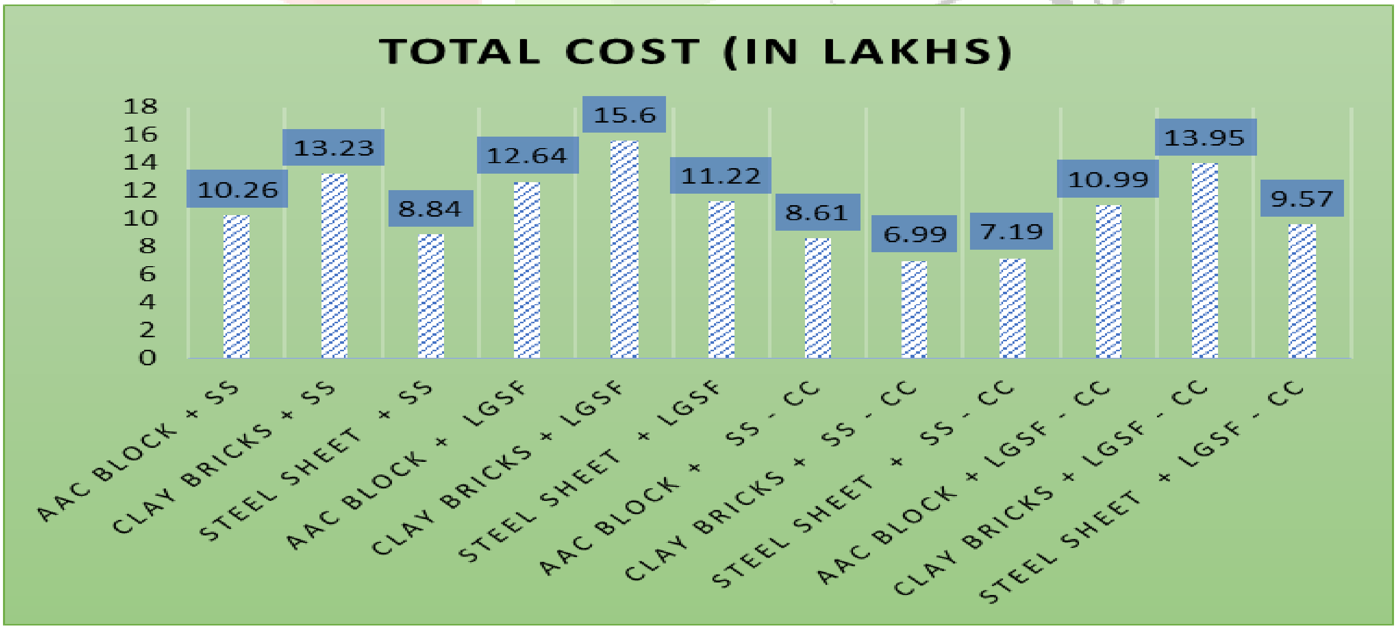

Figure 4.5.2 Graph showing comparison of cost of all four models

5. CONCLUSION

5.1 GENERAL

In this study the effect of different building material on the various response parameters like cost, weight and time are being recorded and the overall cost comparison is being conducted by the help of which observations are being recorded about the circumstances that support the use of a particular building material.

5.2 CONCLUSION

After conducting a comparative study of light steel frame (LGSF) buildings and conventional buildings, it is clear that both construction methods have their advantages and disadvantages. LGSF buildings have several advantages, such as faster construction time, lower labour costs, less material waste, and better resistance to vermin, fire, and earthquakes. On the other hand, traditional buildings offer design flexibility, better insulation properties and potentially lower initial costs in certain scenarios. However, when factors such as durability, environmental impact and long-term maintenance are considered, LGSF buildings often come out on top. as a more affordable option due to the use of renewable materials, energy efficiency and sustainability.

- Overall weight of a warehouse shed made of steel structure with concrete column weighs the most with 29.37 Tonnes and the warehouse shed made of completely LGSF steel weighs the least with only 4.27 Tonnes as the total weight of the structure.
- Structural cost of the structure made up of steel will be most expensive and the structure made up of LGSF steel will be cheapest.
- The overall cost of the structure made up of LGSF steel with steel sheet as end wall bearing covering is the most economical warehouse shed for bearing similar kind of loading condition.
- Overall weight of the structure completely made up of Light Gauge sections is only about 51.6% of the total weight of the structure made up of completely steel section.
- Cost of overall structure without end wall coverings is most economical in case of LGSF. LGSF are about 17.5% cost effective compare to conventional steel structures.
- Cost of overall structure with end wall coverings is most economical in case of LGSF with steel sheets as end wall covering. LGSF with steel sheets are about 16% cost effective compare to conventional steel structures with brick masonry as end wall covering.
- We can consider LGFS as a sustainable material because all the steel material is recyclable.
- LGSF has good thermal performance due to the cavity between the wall panels, unlike RCC and brick buildings.
- LGFS contribution is faster than RCC because 90% of the elements are ready, we only need to assemble off-site.
- LGSF is recommended for commercial premises, warehouses and it is much faster to build outside. it can adapt to future changes without producing non-hazardous and non-recyclable waste.

5.3 COMPARATIVE ANALYSIS BETWEEN RCC AND LGSF STRUCTURE:

Table 5.3 comparative analysis between RCC and LGSF

FACTORS	RCC STRUCTURE	LGSF STRUCTURE
Construction Speed	RCC construction can be time-consuming due to curing times required for concrete and the formwork needed for shaping.	LGSF structures are typically faster to construct due to the prefabrication of components and ease of assembly.
Cost	RCC structures might have lower initial material costs, but labour and time expenses could be higher.	Initial costs for LGSF might be higher due to the cost of steel, but savings can be seen in reduced construction time and labour.
Flexibility in Design	While RCC also offers some flexibility, intricate designs may be more challenging and expensive to implement due to formwork requirements	Light gauge steel framing allows for more flexibility in architectural design due to its ability to be easily manipulated into various shapes and configurations.
Maintenance	Requires periodic maintenance, such as crack repairs, waterproofing, and corrosion protection of reinforcement bars	Generally, requires less maintenance over its lifespan compared to RCC. Regular inspections for corrosion and proper coating maintenance are essential

Construction Quality	It mostly depends on the workers or crafts, so the final product is contradictory.	It is Factory Controlled -End Product precision manufactured and assembled to very high tolerances using advanced techniques.
Thermal Insulation	May require additional measures for insulation, such as external cladding or insulation materials, which can add to construction costs	Steel buildings are thermally insulated. Because there is gap between the wall panels it makes the building coo
Seepages and cracks	Once Seepage occurs – Entire wall has to be broken & repair done.	Only Localized area need be cut open, post repair area will be refitted neatly.

6. REFRENCES

1. IS 801. (1975). Code of practice for use of cold formed light gauge steel structural members in general building construction.
2. IS: 811. (1987). Specification for cold formed light gauge structural steel sections.
3. Kanchan, R. S., and Bharath, R. (2018). "Comparison of Steel and RCC Structures Resistant to Earthquake Forces." International Journal of Civil Engineering and Technology (IJCIET), 9(11), 312-321.
4. Moazami, H. (2016). "Comparative Analysis of Steel and RCC Framed Buildings." Journal of Structural Engineering, SERC, 43(5), 317-325.
5. Ganesan, K., and Selvi, V. (2017). "Comparative Study on Construction of RCC and Steel Structures in High Rise Buildings." International Journal of Engineering Research and General Science, 5(3), 49-58.
6. Sharma, S., and Kulkarni, P. R. (2019). "A Comparative Study of RCC and Steel-Concrete Composite Structure Under Seismic Loading." International Journal of Innovative Technology and Exploring Engineering (IJITEE), 8(7), 1313-1319.
7. Hosseini, M. R., and Kauchak, M. (2018). "Life Cycle Cost Comparison of Concrete and Steel Framed Buildings in Different Seismic Zones." Journal of Building Engineering, 20, 320-332.
8. Ramaswamy, A., and Reddy, B. S. (2016). "Life Cycle Cost Analysis of RCC and Steel Frame Buildings." International Journal of Emerging Technology and Advanced Engineering, 6(3), 341-350.
9. Taheri, M., and Malekzadeh, M. (2017). "A Comparative Study of Construction Costs and Time Between RCC and Steel Structures." Journal of Civil Engineering and Architecture, 11(3), 290-297.
10. El Nimeiri, M. K., and Ibrahim, A. S. (2018). "Life-Cycle Cost Comparison of Reinforced Concrete and Steel Framed Buildings." Journal of Construction Engineering and Management, 144(11), 04018103.
11. Jai Krishnan, K., and Manivannan, K. (2019). "Cost Analysis of RCC and Steel Structures." International Journal of Research in Engineering, Science and Management, 2(2), 1-8.
12. Gupta, A., and Gupta, R. (2018). "Cost Analysis of RCC and Steel Structure for High Rise Residential Building." International Journal of Engineering Sciences & Research Technology, 7(6), 314-322.
13. Salman Mashhad Farahani, Department of Civil Engineering, Azad University, Shahr-E-Kord branch, Iran. (ASRJETS)
14. Prof. S. R. Satish Kumar and Prof. A.R. Santha Kumar, IIT Madras “Design of Steel Structures”.
15. Mr. Hitesh Jaju (MD: MGI Infra Pvt Ltd, New Delhi) & MGI Library. www.mgiinfra.com