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SLUM AREA CLEARANCE BY DEVELOPING LOW COST HOUSING WITH USING GLASS FIBER REINFORCED GYPSUM (GFRG) PANELS

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Abstract-: *The provision of low cost housing is a continuous struggle for government, as well as for the individuals. Everyone is seeking the 'best' low cost housing solution. In the past very attempts were undertaken to address this issue one can find numerous examples of realized low cost housing projects worldwide. This report is mainly concentrate on chapter construction material a few low cost material and planning are discussed in this report. The report are also includes an important chapter as specification the material for real construction of house are specified for example use of light weight solid blocks and as per planning view design of room size is depend upon size of brick and size of flooring material. Recent articulations of "best practice" in the field of infrastructure development in developing countries stress quality, optimum capacity utilization and demonstrable long-term returns on investments over quantitative increases in infrastructure stocks. This has engendered shifts in objectives, design and programming of road projects since the late 1980s and early 1990s, from ad hoc, relief-oriented and transfer-based interventions toward more systematic, strategic, and development-oriented approaches, geared toward sustainable asset-building. After the calculation of quantity for traditional building materials and GFRG Panels savings of cost per unit block difference is 26,380 Rs and total savings of 1 block is 8,44,188 Rs.*

***Key Words*: Low cost housing, Replacement material, Economical and Ecofriendly material, Glass fiber reinforced gypsum panels, Slum area,**

1. INTRODUCTION

Affordable housing is a term used to describe dwelling units whose total housing cost are deemed "Affordable" to a group of people within a specified income range. The construction established by modular planning and use of locally available low cost materials which are reduce the overall cost of the structure. It is necessity to adopt cost effective, innovative and environment-friendly housing technologies for the construction of houses and buildings and availing them at low cost comparatively. According to the Encyclopedia Britannica slums is defined as "the residential area that are physically and socially deteriorated and in which satisfactory life style is impossible."

The Nation Sample Survey Organization (NSSO) defines slums as declared and undeclared slums. The declared slums are those which have been formally declared as slums by the respective governing bodies. The undeclared slums is defined as "an aerial part having twenty-five or more kutcha houses mostly of temporary nature, or inhabited by persons with practically no private latrine and inadequate public latrine and safe water supply.

According to Census, A Slum has been defined as residential areas where dwellings are unfit for human habitation by reasons of overcrowding, narrowness or faulty arrangement of street, lack of ventilation, light or sanitation facilities or any combination of these factors which are detrimental to the safety and health.

2. OBJECTIVES

- To study alternative solution of Housing Scheme as with traditional building material.
- To analyze cost estimation of Housing scheme and comparison with GFRG panels and traditional buildings.
- Estimation comparison of traditional scheme and GFRG panel
- To Promote Low cost housing concept along with GFRG panels to the slum area for provisional of better lifestyle to the slum people as physical and social infrastructure.

3. MATERIAL PROPERTIES

GFRG panels also called gypcrete panel is an energy efficient green building material with huge potential for use as load bearing and non-load bearing wall panels. It has very high level of resistance to fire, heat, water, termites, rot and corrosion. Panels are presently manufactured to a thickness of 124mm, a length of 12m and height of 3m, under carefully controlled condition. The panel can be cut to required size. The panel contain cavities that may be filled with concrete and reinforced with steel bars to impart additional strength and ductility. Its main application is in the construction of

walls floor and roof slab in combination with reinforced concrete.

According to IIT Madras Rapid wall construction, especially in repetitive type mass housing, time for construction will be reduced by 75-80% thereby reducing overall overhead establishment costs with reduced lock up investment period and less labour component. Comparative study of rapid wall building and conventional building (2 storey 1500 sq.ft) shows significant savings in rapid wall buildings. Glass Fiber Reinforced Gypsum (GFRG) Panel branded as Rapid wall is a building panel product, made of calcined gypsum plaster reinforced with glass fibers, for Mass-scale building construction, was originally developed and used since 1990 in Australia. The panel, manufactured to a thickness of 124mm under carefully controlled conditions to a length of 12 m and height of 3m, contains cavities that may be unfilled, partially filled or fully filled with reinforced concrete as per structural requirement.

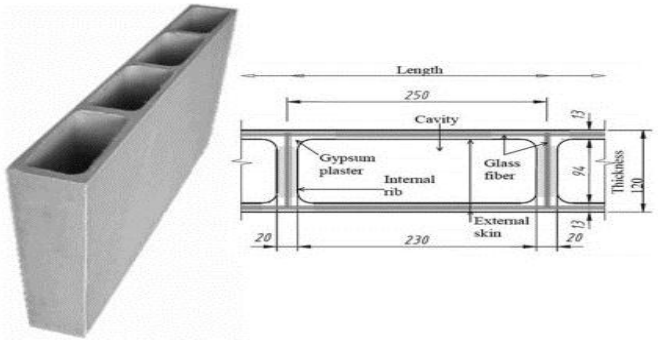
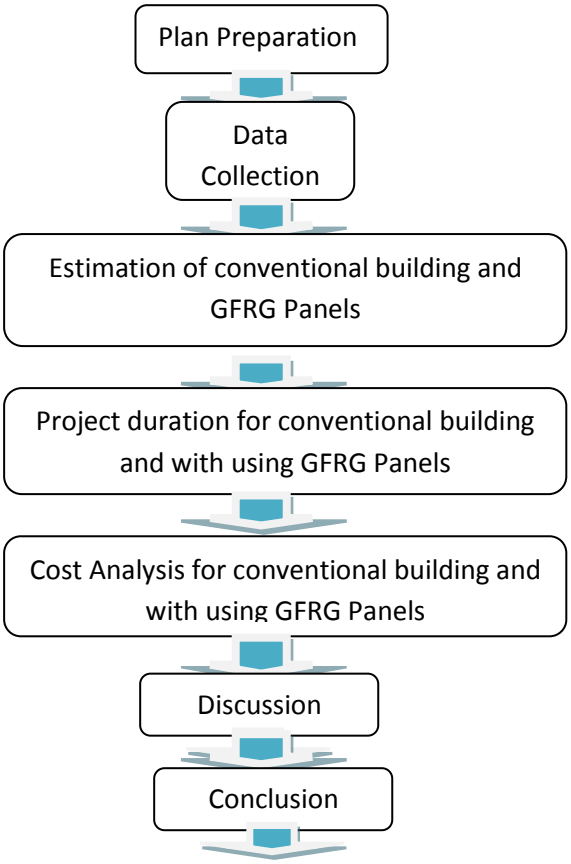


Fig.2: GFRG Panel Dimensions

Size	Length 12m, Height 3m, Thickness 124mm
Cavity Size	48 modular, 230mm * 94mm * 3m
Density	1.14 g/cm^3
Weight	1440 kg
Axial load capacity	160 KN/m^2
Compressive strength	73.2 kg/cm^2
Flexural Strength	21.25 kg/cm^2
Tensile Strength	35 KN/m^2
Fire Resistance	4 h rating withstand 700-1000˚C
Elastic Modulus	3000-6000 MPa
Water Absorption	< 5%

4. METHODOLOGY



5. STUDY AREA

The study area is Prantij Town. Prantij town is situated in Sabarkantha district of Gujarat state. The current population of Prantij Town is 22,596 according to census data of year 2011. According to the gender consideration the male population is about 12093 and female population is 11503. The population of this village in year 2001 was 22,306. According to the gender consideration the male population is about 11,600 and female population is 10,706. The town is well connected by the district centre Himmatnagar at distance of about 20 km. There is one National Highway (NH-08) passes from near the town Prantij. The following study aims to provide residential buildings to the slum area people at low cost also the study works on new technology of precast material Glass Fiber Reinforced Gypsum GFRG for replacement of masonry wall which made of traditional building materials. The main objective is to evaluate cost estimation of Housing scheme and comparison with GFRG panels and traditional buildings materials. By comparison of the cost estimation of building with GFRG panels and traditional building material masonry wall, find out the cost saving from both the results. Arrow shows the study area of Prantij town on the map below.

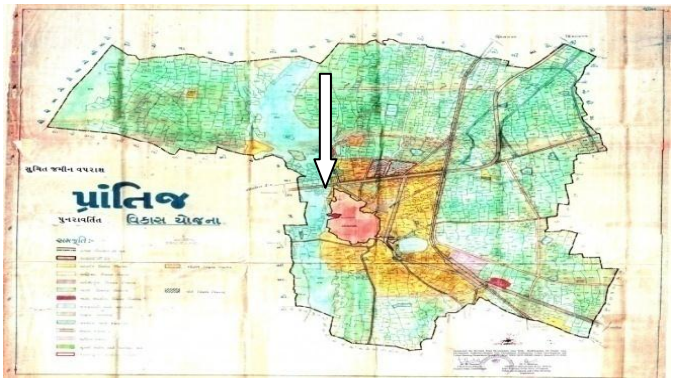


Fig 6.: Map of Prantij Town

6. DATA COLLECTION

In alternative solution layout 1, 14 different symmetrical blocks are settle dimension of 10m * 8m arranged in study area. For other utility area play area and 4 shops are provided for fulfilling basic utility of people. Interior two 6.00m wide street roads are provided. One 9.00m wide road is provided with connecting of main street road and national highway.

In Alternative 2, 14 symmetrical units are well arranged in study area. Five symmetrical blocks are vertically provided for widen play area for basic facilities. In this layout, one street road is available for transportation facility. This street road is directly connected with 9.00m widen main road for better connectivity to main national highway.

In Alternative 3, the whole area can cover 12 units with same alternative 2 wide 2 streets roads. This alternative is combination of alternative 1 & 2. All units are assemble as alternative 1 in apparent row and as alternative 2, 2 wide streets road are provided for better utility.

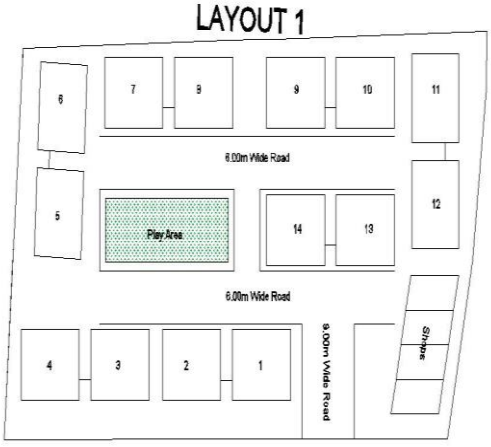


Fig.:7 Altenative Layout 1

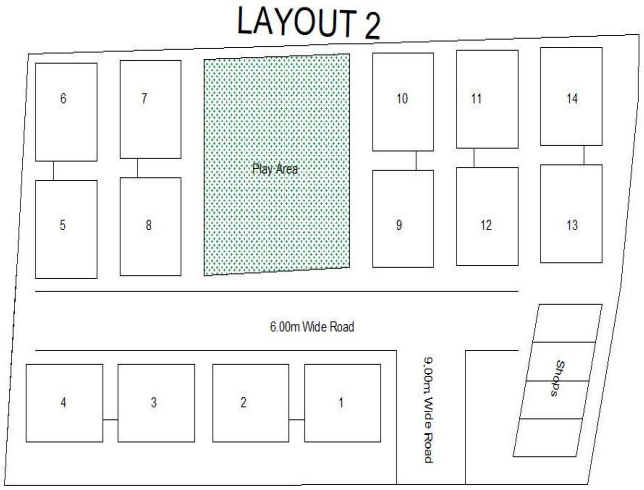


Fig.:8 Altenative Layout 2

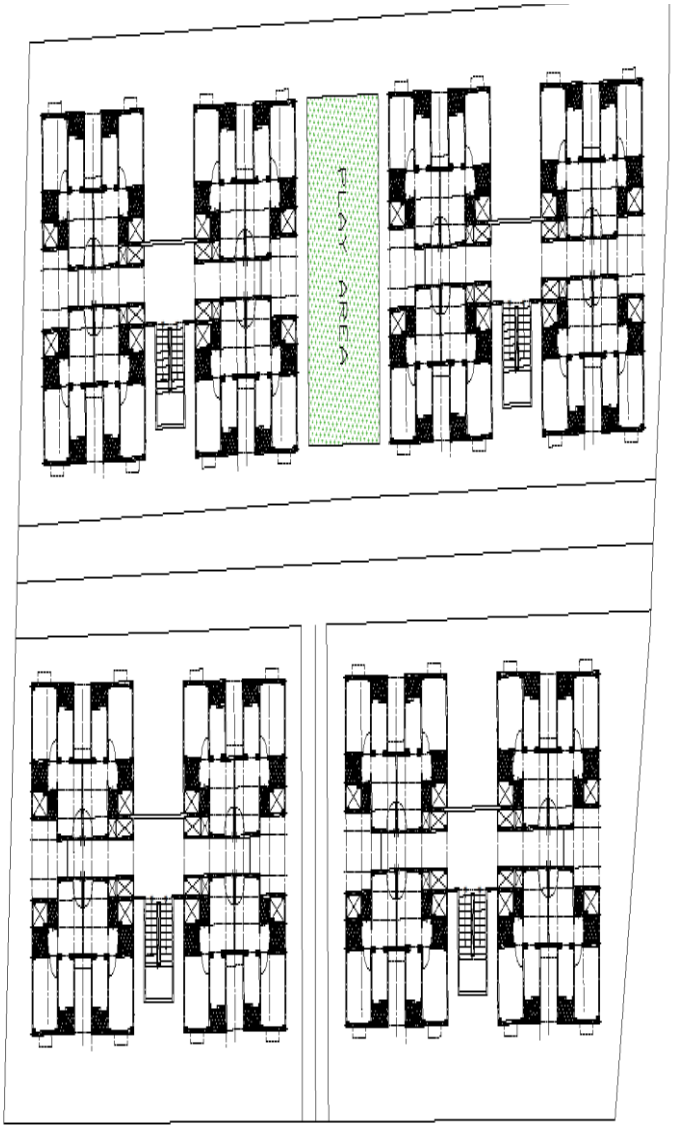
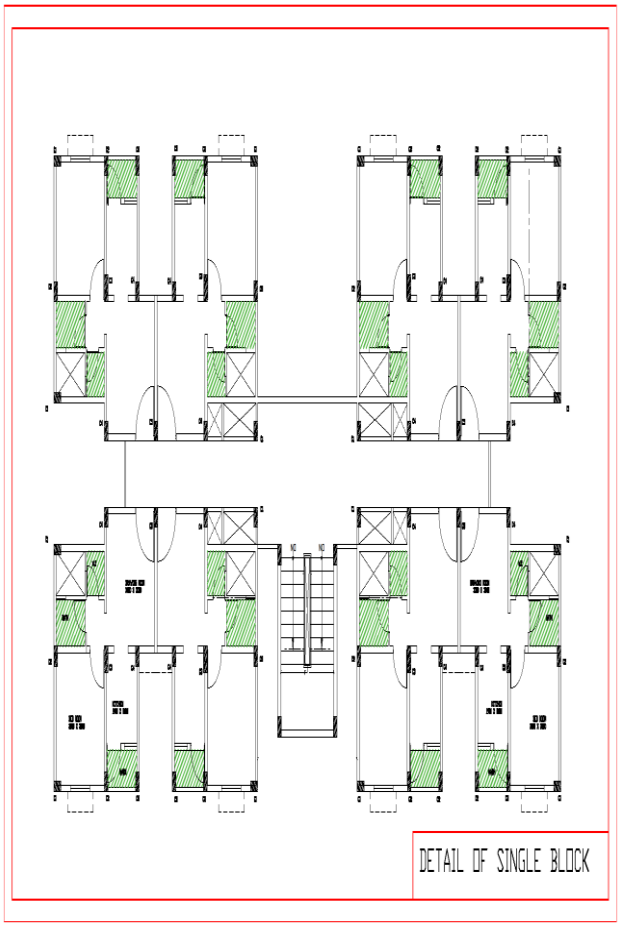
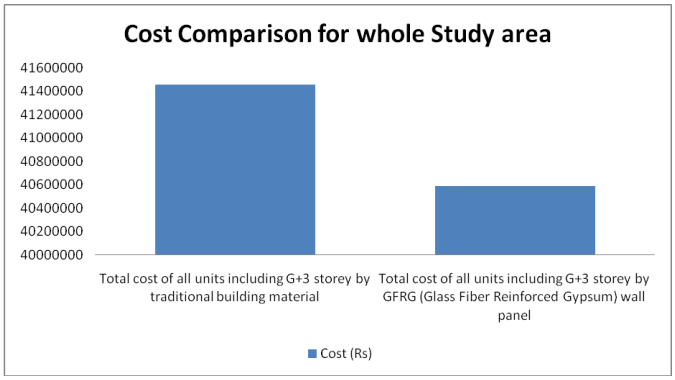
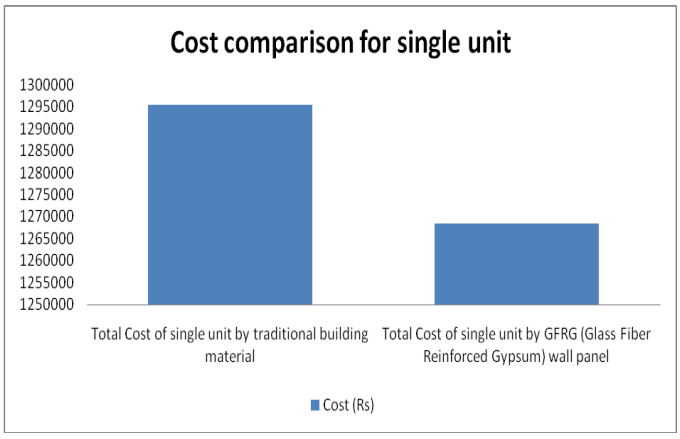


Fig.:9 Altenative Layout 3

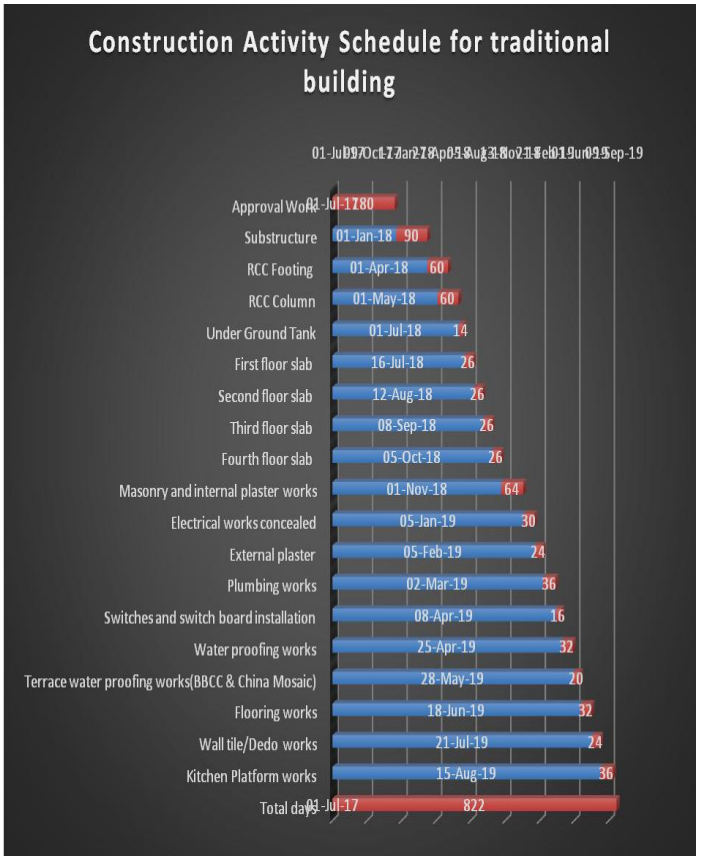


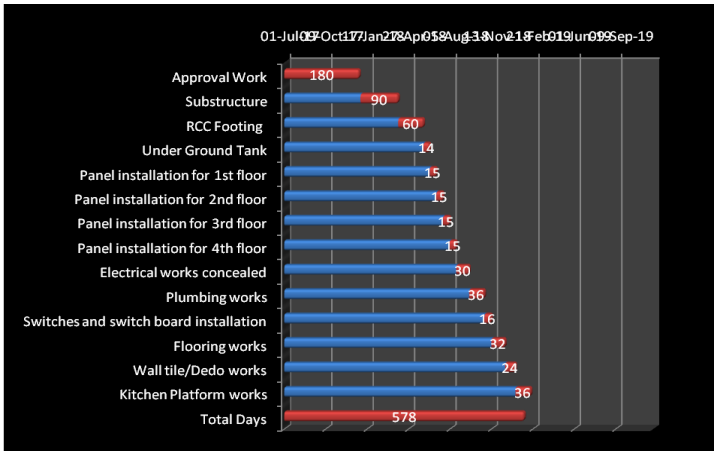




Construction work	Cost (Rs)
Total cost of all units including G+3 storey by traditional building material	41456535
Total cost of all units including G+3 storey by GFRG (Glass Fiber Reinforced Gypsum) wall panel	40590835
Cost Difference	865700

Construction work	Cost (Rs)
Total Cost of single unit by traditional building material	1295517
Total Cost of single unit by GFRG (Glass Fiber Reinforced Gypsum) wall panel	1268464
Cost Difference	27053





7. CONCLUSION

With the above results we can say that by using GFRG Panels as replacement of masonry wall savings in cost for whole study area will be 8.65 lakh and for single unit block savings in cost will be 27,503 Rs. GFRG Panels can used for long term symmetrical project for saving higher cost. To alternate cement consumption in traditional building construction method, GFRG panel is economically and environmentally good solution for low cost housing scheme. By comparison of construction activity schedule, we can conclude that construction with GFRG panel can complete in total 578 days while using traditional building method it can complete in 822 days. A single floor with GFRG Panel can construct in 15 days. While traditional building method take 60 days to construct one floor. In GFRG panel construction time of curing, plastering, beam construction is directly reduced as the material is precast.

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