

# Techno-Economic Analysis of Slum Rehabilitation Housing Project by Pradhan Mantri Awas Yojana using Rapid Wall Technique

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**Abstract** — Slum is a neighborhood with significant population living in substandard housing that lacks basic and social science amenities. Urbanization, growing population and migration pressurizes cities resulting in overflowing infrastructure, increase in urban economic condition and haphazard development of cities. So rehabilitation of slum is important to supply truthful and reasonable homes to slum dwellers.

During this thesis, slum rehabilitation by Public Private Partnership is completed exploitation Rapid wall technique. The information in Pune town is collected. Beneath Pradhan Mantri Awas Yojana housing for all scheme the slum rehabilitation by Public Private Partnership is completed. Techno-economic analysis of rehabilitation scheme by typical/conventional manner and Rapid wall is done. Comparison of time, cost and resources is completed. And best alternative is chosen.

**Keywords-** *Slum rehabilitation, Pradhan Mantri Awas Yojana, Public Private Partnership, Rapid wall technique.*

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## I. INTRODUCTION

Slum is locality with serious population living in substandard housing that lack basic and social science amenities. Urbanization, growing population and migration pressurizes cities resulting in overflowing infrastructure, increase in urban economic condition and haphazard development of cities. Therefore rehabilitation of slum is critical to supply truthful and cheap homes to slum dwellers. Urban industry changes face of geographic region, it's functions too. Because of urban industry city's previous functions are chiefly services, suppliers. City's ancient operate served to optimum threshold, however nowadays it serve additional threshold through defective. It's offer higher financial gain in compare of geographical region. That the surround rural population has attracted toward nearer town or geographic region. This urban provided all season employment. It lead the method of migration. Rural threshold has been migrated toward town or geographic region in search of jobs. These migrants are low educated unskilled and good labour for urban industry. This kind of jobs provided low financial gain labour.

Slum rehabilitation can be defined as, "rebuilding the homes, improving the standard of living of the group of people living under deprived conditions of basic amenities like adequate living area and shelter, water, sanitation and electricity.

Slum rehabilitation may be a welfare work with edges of TDR (Transferable Development Rights) for developers who are involved, if the time and value of construction of slum rehabilitation is reduce while not comprising with it's quality so a lot of and a lot of personal developers are going to be

inspired. By this fashion the slum are unit removed, slum dwellers get a stronger place to reside, developers area unit in profit and therefore the town is developed.

Rapid wall additionally referred to as gypcrete panel is an energy efficient green building material with high potential to be use as load bearing and non load bearing structures. Rapid wall may be a massive load bearing panel with standard cavities appropriate for each external and internal walls. It may used as intercessor floor slab/ roof slab together with RCC as material. Since the appearance of innovative Rapid wall panel in 1990 in Australia, it's been used for building starting from single level to medium high rise buildings. Light weighted rapid wall has high compressive strength, shearing strength, flexural strength and ductility. It's terribly high level of resistance to fire, heat, water, termites, rot and corrosion.

## II. PRADHAN MANTRI AWAS YOJANA

The President of India, in his address to the Joint Session of Parliament on 9<sup>th</sup> June, 2014 had announced "By the time the Nation completes 75 years of its Independence, every family will have a pucca house with water connection, toilet facilities, 24x7 electricity supply and access." Prime Minister envisioned Housing for All by 2022 when the Nation completes 75 years of its Independence. In order to achieve this objective, Central Government has launched a comprehensive mission "Housing for All by 2022" Housing for All (HFA) mission is since launched in compliance with the above objective of the Government and with the approval of competent authority.

### Scope of scheme

- Housing for all missions for urban area will be

implemented during 2015-2022 and this mission will provide central assistance to implementing agencies through states for providing houses to all eligible families or beneficiaries by 2022.

- Mission will be implemented as centrally sponsored scheme.

- A beneficiary family will comprise husband, wife, unmarried sons and/or unmarried daughters. The beneficiary family should not own a pucca house either in his/her name or in the name of his or her family in any part of India.

- States at their discretion, may decide a cut-off date on which beneficiaries need to be resident of that urban area for being eligible to take benefits under the scheme.

- Mission with all its component has become effective from the date 17.06.2015 and will be implemented up to 31.03.2022.

### III. GLASS FIBER GYPSUM BUILDING PANEL SYSTEM

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. Experimental studies and research in Australia, China and India have shown that GFRG panels, suitably filled with plain reinforced concrete possesses substantial strength to act not only as load bearing elements but also as shear wall, capable of resisting lateral loads due to earthquake and wind. GFRG panel can also be used advantageously as in-fills (nonload bearing) in combination with RCC framed columns and beams (conventional framed construction of multi-storey building) without any restriction on number of stories micro-beams and RCC screed (acting on T-beam) can be used as floor/ roof slab.

#### Uses

- As lightweight load bearing walling in building (single or double storey construction) up to two storey construction: the panel may be used with or without non-structural core filling such as insulation, sand polyurethane or lightweight concrete.
- As high capacity vertical and shear load bearing structural walling in multi-storey construction: the panel core shall be filled with reinforced concrete suitably designed to resist the combined effect of lateral and gravity loading.
- As partition infill wall in multi-storey framed building:

Panel may also be filled suitably.

- As Horizontal floor/roof slabs with reinforced concrete micro beams and screed (T-beam action).
- As pitched (sloped) roofing.
- As cladding for industrial building.
- As compound wall.

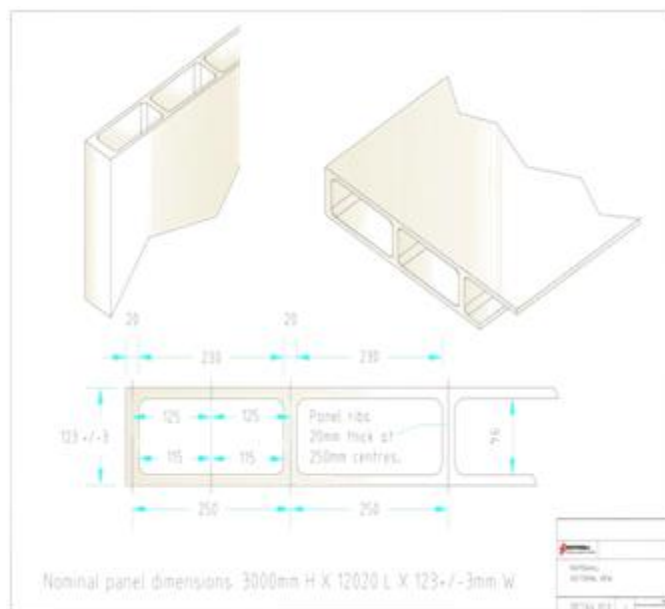


Figure 1. Typical Rapid wall sectional view

### IV. OBJECTIVES

1. To understand the technology of Rapid Wall construction thoroughly.
2. To make the economical comparison between construction of building using rapid wall technique and conventional method.
3. To prepare and analyze slum rehabilitation housing project for a particular slum area by public private partnership and Pradhan Mantri Awas Yojana.

### V. METHODOLOGY

Sr no.	Item	Conventional Building	Rapid wall Building	Remark
1	Concrete (per flat)	30 m <sup>3</sup>	12 m <sup>3</sup>	GFRG requires 60% less
2	Steel	0.33 Tonnes	0.20 Tonnes	GFRG requires 40% less
3	Brick	112000	Nil	
4	Wall Panels	Nil	1056 m <sup>2</sup>	
5	Formwork	Requires	Do not require	
6	Props	More	less	
7	Labour	Requires high	Requires less	
8	Natural resources	Requires high	Requires less	
9	Necessity of cranes	Optional	Must	

10	Time	300-315 Days	180-200 Days	GFRG requires 35% less
11	Cost	Rs 438774	Rs 399663	GFRG requires 10% less
12	Availability	Easily	Panels are available in Cochin.	

In above table the comparison of Rapid wall construction technique and conventional building technique is done.

## VI. RESULT AND DISCUSSIONS

Slum rehabilitation by public private partnership is carried out by conventional technique and rapid wall technique. The rehabilitation is done on the existing slum land. The slum dwellers paid Rs 100000 each for their flat. The contractor will get TDR from Pune Municipal Corporation. The supplier of Rapid wall panels FACT RCF Building Products Ltd. (FRBL) in Cochin and Mumbai. The erection of Rapid wall is done by Bounteous contractor Kerala. Techno-economic analysis of conventional technique and Rapid wall is carried out.

- 1) GFRG building requires 60% less concrete, 40% less steel, 35% less time, 10% less cost, as compared to conventional building.
- 2) GFRG building requires fewer natural resources as compared to conventional building.
- 3) GFRG building does not require formwork for construction.
- 4) The panels are available in Cochin and Mumbai. Hence the manufacturing company should expand their plants where ever possible.

## VII. CONCLUSION

Due to rapid urbanization the slums are growing fast in India. Increasing population is another major reason behind it. Slums are growing mostly on government land. Government should maintain record of their lands and unauthorized slums on it year wise. An officer must be appointed for maintaining the record of unauthorized slums. Government must undertake a well defined action plan for the unauthorized slums. The following are conclusion from this project.

- 1) The review of slum rehabilitation should be made because the funds allocated are money of tax payer.
- 2) Proper steps should be taken by government for identifying new slum areas.
- 3) Rapid wall is a low cost and fast track technique which leads to saving of resources, time and money.
- 4) In today's world of environmental degradation, where resources are exploited, Rapid wall technology is a boon as it is manufactured from the waste gypsum.
- 5) Rapid wall doesn't require formwork and is an easy erection process that leads to light weight structure.

- 6) Rapid wall technique is an ideal for construction of slum rehabilitation projects where low rise buildings are to be constructed.
- 7) In Rapid wall technique we can achieve 10% cost saving as compare to conventional building system.
- 8) In Rapid wall technique we can achieve 35% time saving as compare to conventional building system.

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