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Centre for Research in Schemes and Policies

Field Study Report & Action Plan for Improving Housing for the Poor Schemes

Submitted to

The Director, Department of Rural Development and Panchayat Raj
Government of Tamil Nadu

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Preface

Centre for Research in Schemes and Policies (CRISP) is an organization established by a group of civil servants and public service professionals, each with over three decades of experience. CRISP's mission is to give back to society by assisting governments in designing, redesigning, and implementing improved schemes and policies. The organization collaborates with central and state governments, corporate social responsibility (CSR) funds, and large NGOs, focusing on initiatives with a significant social impact.

Housing is a fundamental need and a basic human right, as recognized by Article 21 of the Indian Constitution, which includes the right to shelter. Reflecting this commitment, the state of Tamil Nadu has launched the Kalaignarin Kanavu Illam scheme (G.O.(Ms.) No. 70, dated 05.03.2024) with the vision of creating a hut-free Tamil Nadu.

As part of a Memorandum of Understanding with the Department of Rural Development, CRISP conducted a dipstick study to examine the conventional housing methods used in government schemes for the poor in Tamil Nadu. This study also explores potential improvements to these housing schemes by investigating cost-effective, alternative technologies that better address the needs of the state and its beneficiaries. Based on field visits and secondary research, this report presents key insights from our observations and provides recommendations for the way forward. The findings and proposed action plan will be presented to the relevant department.

The Department of Housing, Rural Development, and Panchayati Raj supported this study by facilitating field visits and providing essential data, which were crucial inputs for this report. We are grateful for the guidance of Mrs. Devi Shree, ADRD Housing; Mr. Sainath, Consultant with the Rural Housing Department, RDPR; Prof. Prema Rajagopalan, School of Humanities and Social Sciences; Prof. Ravindra Gettu, School of Civil Engineering; and Mr. Abdullah, Senior Architect, whose contributions were invaluable in formulating this report.

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This effort has been spearheaded by Dr. Vijaya Raghavan (State Lead), CRISP Tamil Nadu. . Mrs. Gayatri Ratnam (Honorary Consultant at CRISP and former Joint General Manager of Housing and Urban Development Corporation (HUDCO) has been the primary advisor for the overall content and technology selection for the report. Ms. Heera K. Anil (Research Fellow at CRISP) has been the instrumental in the report preparation, carrying out the secondary research and compilation. All technical content, including the type designs and all related information, has been developed by Architect Dhanasheelan (Research Associate at CRISP).

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List of abbreviations

IAY – Indira Awaz Yojana

BPL – Below Poverty Line

RDPR – Rural development and Panchayati Raj

PMAY-G – Pradhan Mantri Awaz Yojana - Grameen

THAI – Tamil Nadu Village Habitation Improvement Scheme

CMSPGHS – Chief Minister's Solar Powered Green House Scheme

MGNREGA – Mahatma Gandhi National Rural Employment Guarantee Act

IHHL – In-Household Laterine

SECC – Socio - Economic Caste Census

DBT – Direct Benefit Transfer

FTO – Fund Transfer Order

SNA – State Nodal Account

EPS - Expanded Polystyrene panels

RCC -Reinforced Cement Concrete

AAC - Autoclaved Aerated Concrete blocks

A. Executive Summary

This report presents the findings from a dipstick study conducted by the CRISP Tamil Nadu team, with the primary objective of identifying challenges and proposing improvements to housing schemes for the poor. The assessment combines insights from both secondary research and field visits across three districts—Thiruvarur, Thiruvallur, and Chengalpattu—examining approximately 25 houses constructed using various technologies. The report outlines key approaches to enhance these housing schemes and offers a proposed action plan.

The study uncovered several significant issues with the current housing programs.

i. For Beneficiary Selection SECC 2011 data is used, and this misses some newly deprived households. Local dynamics in Gram Sabha verification can influence outcomes. Occasional delays and limited awareness impact beneficiary finalization.
ii. Limited public land availability delays allocations for landless beneficiaries. Newer impoverished households may be excluded due to outdated data. Infrastructure gaps like roads and basic amenities can slow down construction even after land is provided.
iii. The funds allocated under the Pradhan Mantri Awaas Yojana - Gramin (PMAY-G) scheme, set at ₹1.20 lakh per house, are considerably lower than the actual construction costs. This shortfall forces beneficiaries to rely on high-interest loans, placing them under financial strain.
iv. Connectivity issues in rural areas cause delays in geo-tagging. Some local officials face challenges using the technology. These delays can slow fund disbursement and construction progress.
v. A key challenge in Tamil Nadu's implementation of PMAY-G is the absence of a region-specific design framework, similar to the PAHAL initiative in other states. This lack results in a limited catalogue of housing typologies tailored to the region's diverse climates and geographies, leading to homes that may not withstand local conditions.
vi. The houses built often exhibit poor construction quality, including weak foundations, improper roofing, and lack of standardisation in construction practices.
vii. Houses are often built based on designs and costs determined by central or state authorities, which are frequently unsuitable for local land conditions like flood- prone area or low lying lands.

viii. The designs of these houses often fail to reflect local cultural practices. For example, the need for outdoor kitchens and semi-public spaces (like thinnai) is overlooked, resulting in houses that do not meet the functional needs of rural families.

ix. Most rural houses built with government assistance are pucca houses constructed using urban-based materials and techniques. These houses fail to support the rural economy as they do not incorporate local materials, skills, or cultural considerations.

x. Limited Access to Housing Technology and Financial Support: New housing technologies, construction materials, and financial assistance are often inaccessible to the rural poor, further limiting the effectiveness of housing programs.

To address these challenges, the proposed action plan advocates for the adoption of alternative construction technologies identified through our preliminary study and improvement of conventional construction practices.. It also emphasizes the importance of culturally sensitive designs that incorporate traditional elements, such as verandas and improved ventilation.

Action Plan for the Promotion of Alternative Technologies

CRISP proposes a pilot project to test alternative construction technologies in two districts, Thiruvallur and Thiruvarur, with a plan to scale up based on the results. The action plan is divided into three strategies:

1) **Beneficiary-Led Construction**: Beneficiaries under schemes like KKI and PMAY-G will be encouraged to adopt alternative construction technologies. CRISP seeks the support of the Tamil Nadu government to facilitate communication with beneficiaries, raise awareness, and assist in securing permissions for adopting new technologies.

2) **Demonstration Houses**: CRISP will partner with technical agencies, t construct two demonstration houses in each district. These houses, showcasing alternative technologies, will serve as models for local communities. Government support will be needed to allocate PMAY-G funds, select suitable sites, and ensure the construction process is smooth.

3) **Community Buildings through MGNREGA**: Alternative technologies will also be applied to MGNREGA projects, such as panchayat offices and Anganwadi centers. CRISP will work with the government to facilitate the adoption of these technologies in public buildings, ensuring their success is visible to the wider community.

Steps for Piloting

To support the pilot, CRISP will focus on the following:

- **Stakeholder Awareness**: CRISP, with government assistance, will identify and train local NGOs or CBOs in alternative technologies. This includes conducting workshops and exposure visits for beneficiaries and panchayat members to raise awareness and showcase the benefits of these technologies.
- **Implementation of Appropriate Technologies**: CRISP will partner with technical agencies to implement the selected technologies in pilot districts. A set of suitable technologies has been identified for Thiruvallur (e.g., Rat trap bond masonry and RCC filler slabs) and Thiruvarur (e.g., precast concrete panels and RCC plank joists).
- **Development of Type Designs**: CRISP has developed prototype design options for KKI houses, considering factors like plot size and future expansion. These 3D models will be shared with beneficiaries to help them make informed decisions.
- **Livelihood Linkages**: CRISP will provide training, in collaboration with SIRD, to Self-Help Groups (SHGs) to develop "barefoot architects" within communities. This initiative will offer both cost-effective construction solutions and income opportunities for SHG members.

Scaling Up of the Piloting

After the successful piloting, CRISP proposes to scale up the use of alternative technologies across Tamil Nadu with government support:

i. **Learning Consolidation**: CRISP will consolidate the learnings from the pilot into a report.

ii. **Capacity Building Modules**: CRISP will develop training modules for masons and overseers to ensure the adoption of sustainable construction practices.

iii. **Database of Practitioners**: CRISP will support the creation of a database of skilled professionals in sustainable construction, which will help beneficiaries find the right experts.

iv. **Audio-Visual Content**: CRISP will create audiovisual content based on success stories from the pilot to help convince beneficiaries during the scale-up process.

Suggested Steps for Improvement of Conventional Construction Methodologies

CRISP also proposes to address the issue of improvements in conventional construction practices to enhance cost-effectiveness and quality:

i. **Standardization of Construction Practices**: CRISP will work with experts to standardize construction methodologies and improve quality across the state. Training will be provided to masons and overseers to ensure uniformity and efficiency.

ii. **Quality Checklist for Beneficiaries**: CRISP will help train Community Resource Persons (CRPs) from Gram Panchayats to monitor the quality of construction. These CRPs will assist beneficiaries in maintaining standards during the construction of their homes.

By tackling the financial, cultural, and structural challenges of current housing schemes, the action plan aims to deliver sustainable, climate-responsive housing that enhances the living conditions of the rural poor in Tamil Nadu.

Suggestions for Strengthening Housing Policies and Programs

i. The most urgent need is to conduct a state-wide housing survey to assess current housing conditions in rural areas, including the technologies, materials, and investments being used by various sections, especially the poor. There is also an urgent need to study the housing needs of rural populations, particularly weaker sections. This survey should be supplemented by in-depth local studies to explore key issues such as the poor's perception of housing, their capacity and willingness to pay, settlement patterns, and the need for basic infrastructure. Local research organizations could be involved in this task. This survey would provide a sound basis for developing an appropriate housing policy for the rural poor. The Department of Rural Development could undertake this survey and it can be an exercise similar to PAHAL.

ii. Adopting a Decentralized Approach: To ensure housing programs are relevant to local conditions, a decentralized approach should be adopted in both design and implementation. This would involve:

    a) Participatory approach can be adopted from the stage of developing design to construction of the houses.

b) Rural poor often do not prioritise housing due to financial constraints. To address this, a multi-faceted approach is required. This would include lowering housing costs by using affordable technologies and local materials.

c) Setting up local organizational support systems to ensure technological assistance, construction materials, and financial support are available at the district and block levels. Regional research centres, Community – Based Organisations and materials banks would be essential in this context. These centres must be integrated with local development organizations to ensure a coordinated approach.

d) Developing climate-responsive designs are important, given the frequency of natural disasters like floods and cyclones in certain regions, special housing designs for disaster-prone areas need to be developed. While some research exists, more effort is required to create suitable housing solutions for these areas

e) Preparing a database of sustainable construction practitioners and practices in housing in Tamil Nadu: A major requirement is the preparation of an inventory database of available housing technologies at regional levels. This inventory should include innovations from the private sector as well as documents from relevant international organizations. Such an inventory would assist planners and implementers, help identify technology gaps and highlight areas for further research.

iii. One of the major weaknesses of the current housing policy is treating housing as a standalone program. It is essential to link housing programs with other rural development initiatives, such as income generation programs, to increase participation from the poor. Additionally, housing activities could be bundled with the production of local materials (e.g., sun-dried bricks, and bamboo work) and the development of minimum infrastructure, which would strengthen the local economy. Housing programs could also serve as wage employment schemes.

iv. Current housing programs focus on providing new housing sites and houses. However, not all rural poor require new homes—some simply need improvements to their existing huts. Repair to rural houses scheme has introduced a repair and renewal component, and other programs can also give due importance to the same. A Housing Improvement Program should identify the poor who already own land, assess the necessary improvements, and provide technical and financial assistance for these improvements.

B. Scope, limitations and objectives of the study

1. Scope of the study

The action plan developed is a generic one which can be adapted for any site location in the state. It has been conceived from the point of view of ease of scaling up. Inputs and learnings from the pilots proposed in this project in two or more locations can be used to further improve the pilot model proposed and create a robust action plan for replication across all the districts.

2. Limitations of the study

- Dip stick study was conducted using purposive sampling, covering 25 Households.
- The findings presented in the report are based on available secondary literature and observations of the CRISP team during the field visits and cannot be taken as a representation for the whole of Tamil Nadu. Objectives of the study

3. Objectives of the study

- To present an action plan which demonstrates a viable participatory approach to improved designs and appropriate construction technologies suitable for housing for the poor in rural areas of Tamil Nadu.
- To create awareness and acceptability for appropriate alternate non-conventional construction materials and techniques by convincing individual homeowners to build using these selected options under the KKI scheme and taking up demonstration houses and community buildings under MGNREGA with the support of the concerned departments of Government of Tamil Nadu.
- To demonstrate value addition and greening of housing for the poor contributing to lower carbon emissions and the overall achievement of Sustainable Development Goals (SDGs) for the Government of Tamil Nadu.
- To support SIRD and concerned Rural Development departments to conduct capacity building programs on improvement in conventional construction practices for the benefit of the technical personnel involved in construction in rural areas, as also exposure and skill building in non- conventional technologies.

C. Introduction

1. Overview of housing schemes in India

The housing crisis for the poor in India has long been tied to the broader issues of poverty, migration, and rapid urbanization. Post-independence, the Indian government introduced various housing schemes aimed at addressing the needs of economically weaker sections (EWS) and low-income groups (LIG), especially in urban centres where overcrowded slums and inadequate living conditions are prevalent.

Housing as a fundamental right is enshrined under Article 21 of the Indian Constitution, which guarantees the right to life, including adequate shelter. Recognizing the growing housing needs, the government launched early schemes such as the Low-Income Group Housing Scheme in the 1950s. These early initiatives laid the groundwork for state-supported housing programs, although they were limited in scope and unable to meet the vast demand across both urban and rural areas.

To understand the housing policies in India, it's essential to look at the groundwork laid by earlier initiatives. The following timeline highlights the major milestones in India's housing policies over the decades:

Table 1: Major milestones in India's housing initiatives

Year	Housing Scheme/Institution	Key Focus
1952	Subsidized Housing Scheme	Loans for industrial workers and low-income groups
1956	Middle Income Housing Scheme	Loans for middle-income households
1970	Slum Clearance & Improvement Scheme	Rehousing and upgrading slum areas

1972	Environment Improvement of Urban Slums (EIUS)	Provision of basic amenities in urban slums
1975	Housing & Urban Development Corporation (HUDCO)	Public financing of housing projects
1988	Indira Awaas Yojana (IAY)	Rural housing for BPL families
1990	National Housing Bank (NHB)	Promotion of mortgage finance
1995	Urban Basic Services for the Poor (UBSP)	Service delivery with a focus on women and children in slums
2005	Basic Services to the Urban Poor (BSUP)	Improving infrastructure and housing in large urban slums

In the 1980s, the introduction of the Indira Awaas Yojana (IAY) marked a shift towards rural housing. The scheme provided financial assistance to economically disadvantaged families in rural areas. However, urban housing challenges began to intensify as India's cities expanded. This led to the introduction of schemes like the Basic Services to the Urban Poor (BSUP) and the Integrated Housing & Slum Development Programme (IHSDP), which aimed at improving infrastructure and housing conditions for the urban poor.

These initial schemes established the groundwork for more comprehensive programs, each featuring different cost-sharing patterns and unit sizes. These aspects evolved over time, as shown in the table below.

Table 2: Cost sharing under different housing schemes in India (Pan – India Coverage)

Scheme Name	Unit Cost	Centre Share	State Share	Area (sq. feet)
Indira Awaas Yojana (IAY)	₹70,000 - ₹75,000	₹45,000 (Plain Areas)	₹30,000 (Plain Areas)	215 sq. feet
PMAY-Gramin (PMAY-G)	₹1.20 lakh (Plain Areas)	₹72,000 (Plain Areas)	₹48,000 (Plain Areas)	269 sq. feet
PMAY-Gramin (PMAY-G)	₹1.30 lakh (Hilly Areas)	₹1.17 lakh (Hilly Areas)	₹13,000 (Hilly Areas)	269 sq. feet
PMAY-Urban (PMAY-U)	Varies by location	₹1.5 lakh - ₹2.5 lakh	₹0.25 lakh minimum	269-323 sq. feet
Basic Services to the Urban Poor (BSUP)	Varies by project/location	Up to ₹1.00 lakh	Remaining amount by state/ULB	269-323 sq. feet

Region-Specific Schemes

Some housing schemes were designed to address unique regional challenges, including slum development and rental housing.

Table 3: Cost sharing of region-specific centre schemes

Scheme Name	Unit Cost	Centre Share	State Share	Area (sq. feet)
Integrated Housing & Slum Development Programme (IHSDP)	₹80,000 - ₹1,00,000	Up to ₹80,000	Remaining share by state/ULB	269 sq. feet

Slum Clearance & Improvement Scheme	Varies (Slum redevelopment)	Loans of up to 80% of project cost	Limited state participation	1000-1200 sq. feet (development plots)
Affordable Rental Housing Scheme (ARH)	Varies by project	₹2,000-₹3,000 per sqm	Contribution from states/UTs	Depends on project

Building on the foundation laid by schemes like IAY, BSUP, and IHSDP, the Pradhan Mantri Awaas Yojana-Gramin (PMAY-G) was launched in 2016 with a broader vision of "Housing for All." This scheme aimed to provide pucca (permanent) houses with basic amenities to houseless poor households and those living in dilapidated homes in rural areas.

Pradhan Mantri Awaas Yojana (PMAY), aims to provide affordable housing for both rural (PMAY-G) and urban (PMAY-U) areas, with a focus on marginalized communities such as women, Scheduled Castes (SC), and Scheduled Tribes (ST). 90/95 person days unskilled wage employment at the current rates to a PMAY-G beneficiary for the construction of his / her house in convergence with MGNREGS.[1]

Overview of PMAY-G

The **Pradhan Mantri Awaas Yojana–Gramin (PMAY-G)** was launched in 2016-17 by the Union Government to restructure the previous Indira Awaas Yojana and bridge the gaps in the Rural Housing program. The scheme's core objective is to provide *pucca houses* with basic amenities to houseless poor households and those living in dilapidated homes in rural areas, aiming for "Housing for All" by 2022. The program has been extended until 2024.

Under PMAY-G, there are specific schemes and provisions for Scheduled Tribes (STs) and other disadvantaged groups:

Special Provisions for SC/ST: 60% of the total target of houses under PMAY-G is earmarked for Scheduled Castes (SC) and Scheduled Tribes (ST). This ensures a large portion of housing

[1] https://pib.gov.in/PressReleasePage.aspx?PRID=1906812

assistance reaches these communities. If the number of eligible beneficiaries from SC/ST is exhausted, only then will the allocation shift to other categories.

Difficult and Hilly Areas: In regions that are remote or difficult to access, such as hilly or tribal districts (including areas with Left-Wing Extremism), the central government provides a higher cost share—90:10 ratio of Central to State funding. This allows greater financial assistance in these challenging areas

Additional Assistance: Beneficiaries from tribal and backward districts also receive additional benefits like Rs. 12,000 for toilets under the Swachh Bharat Mission (SBM-G), and assistance from the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) for labor

PM-JANMAN: This is a new initiative focusing on the tribal community, aiming to accelerate housing and development for backward tribal areas. It provides direct financial assistance for housing and ensures tribal households receive other benefits such as Ayushman cards, Kisan Credit Cards, and land leases.

These provisions highlight the government's focus on ensuring that tribal communities and other disadvantaged groups are prioritized in receiving housing and related benefits under PMAY-G.

To gain a better understanding of housing schemes for the poor in Tamil Nadu, it is essential to explore both the historical and current schemes in the state which is discussed in the following section.

2. Housing Schemes in Tamil Nadu – Brief History

Tamil Nadu has a rich history of housing schemes that have evolved over the decades, addressing the housing needs of various income groups and promoting sustainable development.

1950s – 1970s: Early Housing Programs

Tamil Nadu aligned with national programs like the Low-Income Group Housing Scheme and the Middle-Income Group Housing Scheme, focusing on urban housing shortages for the EWS and LIG groups. During this period, the Tamil Nadu Housing Board (TNHB) was also formed in 1961 to address housing needs across all income categories, including high, middle, and

low-income groups. The TNHB continues to be a significant player in the state's housing initiatives, catering to both the private and public sectors.

1980s: Focus on Slum Development and Rural Housing

Tamil Nadu pioneered urban slum redevelopment with the creation of the Tamil Nadu Slum Clearance Board (TNSCB) in 1970, aiming to replace slums with formal housing for the urban poor. The Indira Awaas Yojana (IAY), launched nationally in 1985, also became a significant rural housing scheme in Tamil Nadu, focusing on financial support for constructing homes for marginalized communities, particularly Scheduled Castes (SCs) and Scheduled Tribes (STs) .

1990s – 2000s: New Approaches to Housing

In the 1990s, Tamil Nadu began developing more specialized housing schemes. The Amma Pasumai Kudil Thittam, introduced during this time, aimed at providing affordable, environmentally sustainable housing to rural communities by promoting the use of locally available materials like bamboo and mud. This scheme encouraged low-cost, eco-friendly construction methods.

In urban areas, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) provided funding for urban housing and infrastructure development. Tamil Nadu, with its rapidly urbanizing cities, was a major beneficiary, focusing on slum redevelopment and affordable housing projects for the urban poor.

2010s: Expanding the Scope of Housing

In 2010, Tamil Nadu launched the Kalaignar Housing Scheme, with a vision to create a “hut-free” state by replacing thatched huts with concrete houses. This scheme provided financial assistance to economically weaker families in rural areas to build permanent homes. The state government also initiated the Chief Minister’s Solar-Powered Green House Scheme, offering solar-powered houses to rural poor, integrating sustainability into rural housing policy.

2016 – Present: Pradhan Mantri Awas Yojana and State Initiatives

Since the launch of the Pradhan Mantri Awas Yojana (PMAY) in 2015, Tamil Nadu has become one of the leading states in implementing both the urban (PMAY-U) and rural (PMAY-G) versions of the scheme.

Additionally, the state's Amma Pasumai Kudil Thittam, focusing on green housing, and the Kalaignar Housing Scheme have been integrated with PMAY to provide beneficiaries additional support and promote the use of sustainable materials and construction practices. The Kalaigarin Kanav Illam scheme, launched in 2024, continues this vision, aiming for a hut-free Tamil Nadu by offering better financial and material support. An overview of different schemes in Tamil Nadu has been summarised below:

Table 4: Overview of different schemes in Tamil Nadu

Scheme Name	Year	Target Group	Unit Cost	Centre Share	State Share	Focus
Amma Pasumai Kudil Thittam	1990s	Rural communities, eco-friendly homes	₹1.5 lakh - ₹2 lakh	N/A	Fully state-funded	Promotes eco-friendly homes using bamboo and mud
Kalaignar Housing Scheme	2010	Rural poor	₹1.8 lakh - ₹2.5 lakh	N/A	Fully state-funded	Eliminates thatched huts by providing concrete homes
Chief Minister's Solar-Powered Green House Scheme	2010	Rural Economically Weaker Sections (EWS)	₹2.1 lakh per unit	N/A	Fully state-funded	Solar-powered homes for sustainability

Tamil Nadu Adi Dravidar Housing Scheme (TAHDCO)	Ongoing	Scheduled Castes (SC) and Scheduled Tribes (ST)	₹1.5 lakh - ₹2 lakh	N/A	Fully state-funded	Provides housing support for marginalized groups
Housing for Fishermen Scheme	Ongoing	Fishermen communities	₹4.62 lakh per unit	35%	65%	Builds pucca houses with major state funding
Pradhan Mantri Awas Yojana-Gramin (PMAY-G)	2016-Present	Rural Economically Weaker Sections (EWS)	₹2.76 lakh (TN)	₹1.03 lakh	₹1.72 lakh	State provides extra funds to cover high construction costs

State Support for PMAY-G

The sharing pattern for PMAY (G) between Union and State government is 60:40. Unit cost fixed by the Union Government is Rs.1,20,000/-. In Tamil Nadu, while the 60:40 ratio applies, the state contributes a higher amount. This distribution reflects an **actual cost-sharing of 38:62** between the Union and State governments in Tamil Nadu, contrary to the official 60:40 ratio.

Table 5: Unit cost sharing of PMAY-G houses in Tamil Nadu

Details	Central Share	State share	Total
Unit Cost	Rs. 72,000	Rs. 48,000	Rs. 1,20,000
State additional funding for RCC roofing	-	Rs. 1,20,000	Rs. 1,20,000
Construction of Individual Household Laterine	Rs. 7,200	Rs. 4,800	Rs. 12,000
90 Mandays under MGNREGA	Rs. 24,570	-	Rs. 24,570
Total	Rs. 1,03,770	Rs.1,72,800	Rs. 2,76,570

Source: *RDPR policy note 22-23*

Reviewing the brief history of housing shows that this issue has persisted for a long time. Despite various initiatives, the challenges related to housing still require significant attention. Housing is a fundamental human right, and the issue has not been fully resolved. It is important to examine the challenges and shortcomings of current housing schemes. Understanding the pain points will help us identify the primary challenges that are hindering the success of these initiatives aimed at providing housing for the poor and we are exploring these pain points in the following chapter.

D. Insights and Challenges - Housing for the Poor Schemes

This chapter aims to identify the primary challenges in the implementation of the Pradhan Mantri Awas Yojana-Gramin (PMAY-G), as highlighted by various research reports and also observations related to the KKI guidelines and findings from limited field studies and also learnings from construction practices and techniques followed in traditional houses. The objective of this preliminary study is to achieve a better understanding of the significant issues affecting housing schemes for the poor and while also considering the traditional interests of the community, allowing for the development of a proposed action plan for CRISP piloting. It is essential to note that this analysis is based on secondary research and a limited number of field visits.

4. Challenges in PMAY-G implementation

The following key issues have been highlighted in various reports and field assessments regarding PMAY-G implementation :

a) Beneficiary Selection

The selection of beneficiaries under PMAY-G is based on the Socio-Economic and Caste Census (SECC) 2011 data, which aims to identify the most deserving households objectively reinforcing the transparency and accuracy of the process.

Critical Steps in Beneficiary Selection:

- **Identification and Selection**: Beneficiaries are selected using SECC 2011 data, which prioritises households that do not have a *pucca* house (a permanent house with basic amenities). This selection process is performed at the Gram Panchayat level and verified in the Gram Sabha.
- **Verification by Gram Sabha**: The list generated from the SECC data is subject to community scrutiny and approval by the Gram Sabha. This verification process ensures that the local population validates the fairness of the list.
- **Finalization and Allocation**: Once the list is verified, financial assistance is extended to the beneficiaries, typically in multiple instalments, to ensure the construction of a proper house.

Problems in the Beneficiary Selection Process:

While the selection process is meant to be transparent, several issues were identified during the assessment:

- **Data Limitations of SECC 2011**: The reliance on SECC 2011 data means that the information used for selection is outdated. Many newly deprived households or have undergone significant economic changes since 2011 are not captured, leading to exclusion errors.
- **Discrepancies in Gram Sabha Verification**: The verification process by the Gram Sabha, while intended to ensure fairness, can be influenced by local political or social dynamics. Sometimes, genuinely eligible households may be left out due to local disputes or favouritism.
- **Inconsistent Application of Guidelines**: The guidelines for selecting beneficiaries are not always uniformly applied across states and districts. In some areas, officials may fail to adequately verify the SECC data or use the criteria, leading to inconsistencies in the selection process.
- **Delays in Beneficiary Finalization**: The finalisation of the beneficiary list and the subsequent release of funds can be delayed due to bureaucratic inefficiencies, resulting in households not receiving timely assistance.
- **Lack of Awareness and Grievance Mechanisms**: Many potential beneficiaries are unaware of the criteria for selection or the process to appeal if they are excluded. This lack of awareness is compounded by insufficient grievance redressal mechanisms to address complaints regarding exclusion from the beneficiary list.

b) Land Allocation:

Under PMAY-G State governments are responsible for allocating land, primarily from government or public resources like panchayat lands to landless beneficiaries.

Issues with Land Allocation

- **Insufficient Public Land:** Lack of available government land in some rural areas delays land allocation for the poorest, especially landless laborers.

- **Exclusion of the Poorest:** Using SECC 2011 data can exclude new households who has fallen into poverty, leading to their omission from both financial and land aid.
- **Political Interference:** Local Gram Sabha involvement can lead to biased decisions, excluding deserving households due to favoritism.
- **Infrastructure Deficits:** Even when land is provided, lack of basic amenities like roads and electricity can stall house construction.[2]

c) **Insufficient Unit Assistance**:

The government provides Rs. 1.20 lakh per house in plains and Rs. 1.30 lakh in hilly or difficult regions. However, many beneficiaries found this amount inadequate, especially given rising material costs. According to various studies[3] on PMAY-G these are the options beneficiaries depend on:

- **Private Moneylenders & Building Material Suppliers (54%):** The majority of beneficiaries source additional funds from informal avenues, like private lenders or material suppliers, often at high interest rates
- **Friends and Relatives (18%):** A considerable proportion also relies on social networks, borrowing from friends and relatives
- **Savings/Selling Assets (5%):** Some beneficiaries deplete personal savings or sell/pledge assets to complete their house
- **Formal Loans (Banks, SHGs):** Despite guidelines encouraging beneficiaries to take loans (up to Rs. 70,000), very few beneficiaries (3% for SHGs, less than 1% for banks) access this option. This is attributed to reluctance from banks to lend for government projects and a general lack of trust in formal loan systems

Rural poor often do not prioritize housing due to financial constraints. To address this, a multi-faceted approach is required. This would include, lower housing costs by using affordable technologies and local materials. Another approach is to link housing programs with income generation programs to facilitate loan repayment. While subsidies may provide temporary

[2] PMAY-G guidelines
[3] Impact Assessment of PMAY-G – NIRDPR & An Assessment of Service Delivery Governance Issues And Challenges In Implementation Of Pradhan Mantri Awas Yojana –Gramin (PMAY-G)

relief, long-term solutions like affordable loans with easy instalments are more sustainable. Innovations in housing finance are critical. Rural people may not have regular monthly incomes, so flexible repayment schedules (such as seasonal instalments) could be introduced. Ideas like encouraging the poor to contribute labour in construction or linking housing with savings schemes could also be helpful.

d) GIS/Geo-tagging technology[4]

Geo-tagging is integrated into the **AwaasSoft** MIS (Management Information System), enabling real-time tracking of each house being constructed under the scheme.

Process of Geo-Tagging:

- **Geo-Tagging Technology**: Each house sanctioned under PMAY-G is geo-tagged with its geographical coordinates. This is done through mobile applications which capture the GPS coordinates of the house location, along with a photograph of the construction stage. The technology ensures transparency and helps in remote monitoring.
- **Stages of Geo-Tagging**: The geo-tagging of houses occurs at different stages of construction, generally at:
    i. **Foundation Level**: After the foundation is laid.
    ii. **Plinth Level**: When the construction reaches the plinth stage.
    iii. **Roof Level**: Upon reaching the roof stage.
    iv. **Completion Stage**: After the construction is fully complete.
- **Real-Time Monitoring**: The use of geo-tagging allows for real-time updates on the status of house construction across various regions. This data is available on **AwaasSoft** and accessible to central, state, and district-level authorities. It ensures that the funds released in instalments are used at appropriate stages of construction.
- **Transparency and Accountability**: Incorporating geo-tagging enhances program transparency, as each house's progress can be visually and geographically verified. It minimises the chances of false reporting, delays, and corruption.
- **Integration with MIS**: The geo-tagged information is integrated with other databases within the **AwaasSoft** MIS platform. This enables the government and implementing

[4] Impact Assessment of PMAY-G - NIRDPR

agencies to analyse the performance and progress of the program in various regions and take corrective actions where needed.

Challenges in Geo-Tagging:

Despite its benefits, there are challenges associated with geo-tagging under PMAY-G:

a) **Lack of Technical Know-How**: In some areas, local officials and beneficiaries are not well-versed with the technology, leading to improper tagging or delays.
b) **Connectivity Issues**: Geo-tagging relies on mobile network connectivity. In remote rural areas, poor connectivity may delay the timely data upload to the system.
c) **Implementation Delays**: Sometimes, delays in geo-tagging at various stages can delay the disbursement of funds and slow down the house construction process.

Apart from these general challenges in the PMAY-G implementation across India, there are few challenges pertaining to Tamil Nadu which emerges in the existing literature studies.

a) Funding Gaps and Mismatched Cost Sharing: As per the Schedule of Rates (SoR) of Tamil Nadu, the actual cost of constructing a 269 sq. ft. house under PMAY-G is ₹4.62 lakh, which far exceeds the ₹1.20 lakh allocated by the Union Government. This discrepancy has placed a substantial financial burden on the state government and beneficiaries. Moreover, despite the official 60:40 cost-sharing ratio between the Union and State governments, Tamil Nadu's actual contribution stands at 62%, further straining state resources.[5]

b) Quality of Construction:. A **2019 study by the State Planning Commission** found that over 40% of rural homes constructed under PMAY-G in Tamil Nadu suffered from issues such as weak foundation, improper roofing, and poor sanitary facilities[6]

c) Beneficiary Participation and Awareness: Despite efforts to include beneficiaries in the decision-making process, low levels of participation have been reported. Field studies indicate that many beneficiaries are either unaware of their entitlements or lack the technical know-how to ensure that construction follows guidelines. This issue is

[5] Tamil Nadu state budget 2023 https://www.tn.gov.in/
[6] Tamil Nadu State Planning Commission Report, 2019. https://spc.tn.gov.in/

compounded by limited grievance redressal mechanisms at the local level, as reported by a **2020 NITI Aayog Evaluation Report.**[7]

d) **Delays in Fund Disbursement**: Fund disbursement delays, both from the Union Government and state administration, have resulted in construction halts in several areas. A **2022 audit by the Comptroller and Auditor General (CAG)** found that many projects experienced delays of over six months due to procedural bottlenecks in fund transfers through the Public Financial Management System[8]

e) A key challenge in Tamil Nadu's implementation of PMAY-G **is the lack of a region-specific design framework, similar to the PAHAL initiative seen in other states**. Without such an exercise, Tamil Nadu lacks a catalogue of housing typologies tailored to its diverse climates and geographies. This absence can result in homes that are less resilient to local conditions and do not maximize the use of available materials or cultural relevance. Introducing a PAHAL-like initiative in Tamil Nadu could ensure the construction of disaster-resistant, cost-effective homes that meet local needs, improving both the quality and sustainability of rural housing.

f) **Convergence with other programs**: One of the main limitations of the housing programs is that it is viewed in isolation as a standalone scheme convergence with other infrastructure and development programs. Additionally, housing activities could be bundled with the production of local materials (e.g., sun-dried bricks, bamboo work) and the development of minimum infrastructure, which would strengthen the local economy. Housing programs could also serve as wage employment schemes.

The current housing challenges, along with the funding gaps and quality concerns, necessitate a fresh approach to rural housing that prioritizes beneficiary engagement and the adoption of cost-effective, sustainable technologies. After understanding these challenges, we have also tried to pin point the preliminary observations made during filed visits in the following section.

3. Field Study

This section elaborates on preliminary observations from the dipstick study conducted by the CRISP Tamil Nadu team with field visits to Thiruvarur, Thiruvallur, and Chengalpattu districts.

[7] 2020 NITI Aayog Evaluation Report.
[8] CAG Report, 2022 https://spc.tn.gov.in/

Field visits were conducted across three districts in Tamil Nadu, purposive sampling was used for the selection of the sites.

Distrcits	**Panchayats Visited**
Thiruvarur	Pinnavasal, Keerakkalur, Velagudi, Mavattukud
Thiruvallur	Moovur, Goonipalayam, Velamakandikai
Chengalpattu	Urapakkam, Mudichur

During these visits, approximately 25 PMAY-G houses were inspected, showcasing various construction technologies.

Data Collection

i. **Questionnaire:** A structured questionnaire *(Refer annexure III)* was developed and administered to beneficiaries and ground-level staff, including overseers, assistant engineers, and executive engineers, to identify challenges and gather insights.

ii. **Observation:** Field observations focused on different construction technologies used in PMAY-G houses.

a) Non – conventional building materials and techniques for construction observed during the field study

Shear wall technology

The housing project is constructed under the PM – JANMAN scheme in the Chengalpattu district and consists of 1 BHK house with external toilets, designed with robust construction techniques. The foundation is laid using Reinforced Cement Concrete (RCC) footing, and the walls are constructed as shear walls integrated with an RCC structure, namely an RCC wall & floor slab

with the plinth level set at 0.3 meters and a floor height of 3 meters. The overall design aims to ensure long-term stability and safety for the residents.

Interlock Technology

The house in Velagudi Panchayat, Thiruthirapundi Block, Thiruvarur district, is constructed using sturdy and cost-effective materials. The foundation is built with stub footing, providing a stable base for the structure. The walls are made of fly ash interlock blocks, which serve as a load-bearing structure. Each block, sized at 8” x 10” x 5”, costs around ₹65 to ₹70. The roof is constructed with a conventional RCC slab, offering durability and protection. The floor height is 2.75 meters, with a plinth height of 0.6 meters, ensuring the house is elevated and well-protected from ground moisture. The overall design focuses on creating a robust and sustainable structure within a reasonable budget.

AAC Block Technology

This house is built on a conventional RCC footing foundation, ensuring a solid and stable base. The walls are constructed using AAC (Autoclave Aerated Concrete) blocks, designed as part of a framed structure. Each block measures 8” x 24” x 8”, providing lightweight yet strong insulation. The roof consists of a conventional RCC floor slab, adding durability to the overall structure. The floor height is 2.75 meters, with a plinth level of 0.3 meters, ensuring the house is well-elevated and protected from potential ground moisture. This combination of materials and design elements contributes to a sturdy and efficient construction.

Expanded Polystyrene Panel (EPS) Technology

The house is constructed with a total budget of ₹3,50,000, covering a floor area of 269 sq ft. The foundation is built using RCC pile foundations; the walls and roof are made from EPS (Expanded Polystyrene) panels, reinforced with a GI (Galvanized Iron) grid and sandwiched between 4-inch thick layers of cement plaster, providing structural integrity and insulation. The windows are framed with aluminium and fitted with glass, while the doors are crafted from

durable country wood. Cement flooring is used throughout the house, with a floor height of 2.75 meters and a plinth level of 0.3 meters, offering protection from ground moisture. The construction process is efficient, with the entire house being completed in 30 days, including five days allocated for scaffolding.The EPS panels also serve as thermal insulators, enhancing the building's energy efficiency. BMTPC approves this technology. M/s BEARDSELL LTD., Chennai, makes EPS panels. However, it must be pointed out that the panels use thermocol, which is a non-biodegradable material, and therefore not an environment-friendly or sustainable option.

Stabilised earth interlocking block technology

Much to the surprise of the CRISP team, during the field visit to Tiruvallur, we came upon a house constructed with compressed stabilised earth blocks under the flood housing scheme. Details given in later section.

Conventional PMAY Houses and self-built housing of rural/EWS families

During the field visit, the team also observed conventional PMAY houses. The house commonly found is built on a conventional RCC foundation. The walls are constructed using traditional brickwork in an English Bond pattern, integrated into a framed structure with RCC columns & beams. The roof consists of a conventional RCC floor slab. The floor height is 2.75 meters, with a plinth level of 0.6 meters. The doors and windows are made from country

wood. The housing structure and plot area vary according to the beneficiaries' preferences and financial capabilities, allowing for flexibility in design and size.

The CRISP team also visited a self-built house in the same vicinity.In one of the self-built houses observed during the visit to Chengalpattu district, both front & side setbacks were covered with semi-permanent roofing and at the time of the visit the entire family (3 generations were seen using the semi covered space in the front of the built unit)

Within the limitations of very small plot sizes & small built-up areas attempts have been made in the type designs developed to capture some lessons from traditional architecture. Design details envisaged are

1. Continuous ventilation gaps between the wall and the roof where jalis with rodent proofing can be provided.
2. Extension of the plinth as a built-in seat in front of the house which can serve the function of the thinnai.
3. The designs provide easy access from the kitchen to the setback areas to facilitate using the space for outdoor work area or outdoor cooking area as observed in many traditional self-built rural houses.

4. Understanding the organic nature of built homes & the expanding requirements in the type designs provided thought has been given to possibilities for future expansions.
5. In some type designs semi covered verandas with built-in seats have been provided reminiscent of traditional ‘thinnai’.

Here, the conventional living pattern was evident with a semi-covered open veranda both in the back & the front, which seemed to be used almost through the day, with the built rooms being used only for storage or sleeping at night. Both for cooking and bathing family preferred semi-covered areas in the backyard. These observations reinforce the need to be sensitive to the social and functional requirements of the rural families for whom the houses are being designed.

b) Comparative analysis of conventional construction practices in PMAY- G observed during field visits

In Tamil Nadu, the most prevalent construction methods in PMAY projects include:

- Burnt clay brick masonry with English bonds
- Plastered walls
- Framed structures with R.C.C (Reinforced Cement Concrete) columns and beams
- R.C.C roof/floor slabs and foundations

Advantages:

i. **Widespread Availability**: These construction methods are widely adopted and familiar due to their long history of use. As a result, materials such as cement, steel, burnt clay bricks, and aggregates are readily available across the state and the country.

ii. **Familiarity**: Both builders and beneficiaries are accustomed to these construction techniques, which contributes to their widespread acceptance.

iii. **Ease of Maintenance**: The familiarity with these methods extends to their maintenance, making it easier for people to manage and upkeep their structures.

iv. **Skilled Workforce**: The availability of trained contractors and labour teams ensures that even unskilled labourers can be effectively trained in these construction methods.

Disadvantages:

i. **Technical Supervision Requirement**: Construction with materials like cement and concrete demands close technical supervision and stringent quality control to ensure structural integrity. Common site-level mistakes, such as improper mixing ratios (e.g., excessive fine aggregates in M20 concrete or overuse of water), can compromise the strength and durability of the structure.

ii. **Environmental Impact**:

- **Cement Production**: Cement is not environmentally friendly due to several factors:
  - **Greenhouse Gas Emissions**: Cement production is responsible for approximately 8% of global carbon dioxide emissions, stemming from both the chemical conversion of limestone and fossil fuel combustion.
  - **Water Usage**: The process is highly water-intensive, especially during the cooling phase after high-temperature baking.
  - **Air Pollution**: Emissions include nitrogen oxides, sulphur dioxide, chlorides, fluorides, and heavy metals, which impact air quality and human health.

- **Brick Production**: The brick industry also poses significant environmental challenges:
    - **Air Pollution**: Brick kilns release pollutants such as carbon dioxide, sulphur dioxide, and particulates, often burning scavenged fuels like wood and waste oil, which contribute to air pollution.
    - **Soil Quality**: Brick kilns can degrade soil quality, negatively affecting vegetation and agricultural productivity.
    - **Deforestation**: The use of wood as fuel in brick kilns can lead to deforestation.
    - **Resource Depletion**: Extracting clay for brick manufacturing depletes natural resources and causes landscape degradation.
    - **Mining Pollution**: Mining for raw materials results in emissions, pollution from machinery, and waste that can contaminate water sources.
    - **Erosion and Water Table Impact**: Traditional clay brick production negatively impacts water table levels

In conclusion it would be a prudent strategy to minimise, or at least optimise the use of burnt bricks and cement in construction

c) Findings and insights on PMAY-G implementation observed during the field visits.

i. Beneficiary Awareness

- **Field Insights:**
    - Many beneficiaries had limited understanding of construction technologies and were not actively involved in their housing projects, highlighting the shortcomings in awareness and involvement. The PMAY-G guidelines emphasize "habitat and housing literacy" as part of the administrative fund.

However, there seems to be no explicit mention of comprehensive educational programs focusing on construction technologies for beneficiaries.

- **Suggestions:**
    - **Ground-Level Training:** Expand training programs to include field staff and beneficiaries, ensuring better implementation and understanding of the program at all levels.
    - **Capacity Building Workshops:** Conduct regular workshops for both officials and local teams to keep them updated on best practices and new developments.

ii. Understanding Acceptance

During the field visit, the CRISP team came across a family which has used compressed stabilised earth blocks for the construction of houses under the flood housing scheme ***(see box 1).*** Here is an example of how a poor family has voluntarily selected an appropriate technology without any direct intervention by the government but only with the support and encouragement of the local technical officials.

iii. Costing Challenges

- **Field Insights:**
    - The first stage payment is only released after the plinth level construction, which leads the beneficiary to move into debt trap as they depend on money lenders and other informal finance where they have to pay huge rates of interests, to bring the construction up to plinth level. In cases where the site is low lying there is a practice of constructing higher plinths to raise the house above the existing road level and this increases the cost of foundation considerably.

- Field study revealed incomplete houses due to insufficient funds for finishing touches like painting, directly linking financial constraints to project incompletion. The assistance provided under PMAY-G and the SoR done by states has a gap indicating underestimation of costs. For example; as per SoR of Tamil Nadu, the actual cost of constructing a house of 269 sq.ft as per PMAY(G) specifications is Rs.4.62 lakh, which is much higher than the unit cost provided by the Union Government.[9]

- It was also noted that in some cases, beneficiaries use the funds for personal purposes, such as weddings, which results in incomplete houses, as they are unable to gather the necessary amount again

- **Suggestions:**

  - **Cost – effective Technologies**: Explore options where the construction of houses can be completed in a manner where the end user gets better value for the money spent. This is particularly significant considering that the financial resources are very scarce.

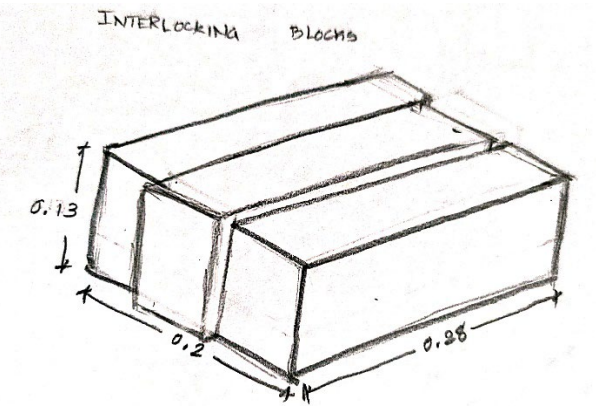
  - **Diverse Financing Options:** Expand access to finance through self-finance, state programs, and microcredit. Promote financial products tailored for the informal sector, such as loans from non-banking financial companies and specialized bank products.

  - **Financial Literacy Programs:** Implement programs to educate beneficiaries on managing loans and avoiding debt traps.

  - **CSR funds:** The government could explore utilizing CSR funds to help cover the additional costs involved in constructing houses. However, this should be restricted to the confidence-building in technology phase of the pilot programme, and would not be a suitable strategy for scaling-up operations.

[9] Policy note RDPR 2022- 2023

Box 1: House with CSEB Interlock Technology, Thiruvallur district:



Photos & Sketch – Ar.Dhanaseelan

The residence of Mrs. Angel suresh is constructed with CSEB interlock block with dimension - 28 cm X 20 cm X 13 cm located in Velamakandikai panchayat, poondi block, Thiruvallur district. The house is built in a 5 cent plot come under the scheme of Tamil nadu State flood housing scheme. Plinth level is raised to 60 cm & floor height of 3 m framed with R.C.C columns & beams. Construction with CSEB interlock blocks are fast construction which does not require mortar for laying the blocks.

iv. Operational Difficulties and Requirements

- **Field Insights:**

  - Observations revealed excessive costs for plinths and filling in low-lying areas. Better site selection and planning could mitigate these issues.
  - Provisions of sill bands need to be rationalised and incase a plinth beam is provided, in many cases the sill band can be avoided saving costs on concrete.
  - Introduction of RCC column in G+1 and G+2 storey buildings, especially those will small span roofs and with lightweight roofing structures, is unwarranted.
  - Scaffolding used is of poor quality, which is a prerequisite for casting in-situ concrete roofing. Often, rough-cut planks are employed instead of steel plates, as is common in urban areas. The poor quality of these planks, combined with the pressure to remove scaffolding quickly to save on rental costs, often leads to sagging in the concrete, negatively affecting the quality of the slab.

- **Suggestions:**

  - Avoid constructing houses in flood-prone or waterlogged areas when operating with a limited budget. Consider alternative sites that do not require extensive height of plinth.
  - Removing unnecessary column which will reduce construction costs and simplify the building process.
  - Orientation and training on improved construction practices, such as correct water-cement ratio for concrete, site and materials management, is essential to improve the quality of conventional construction. Eliminating the use of sill bands especially where plinth bands are provided, can significantly reduce construction costs without affecting structural integrity.

- As detailed in the technology section, using precast or partially precast roofing is a better option. This will eliminate the need for scaffolding, ensuring better quality roofing without compromising strength or durability.

v. Aesthetic and Cultural Design Considerations

- **Field Insights:**
  - Most rural houses built with government assistance are pucca houses constructed using urban-based materials and techniques. These houses fail to support the rural economy as they do not incorporate local materials, skills, or cultural considerations.
  - Beneficiaries preferred outdoor cooking despite having a designated kitchen space. Future designs should accommodate such cultural practices.
  - Beneficiaries appreciated the inclusion of ventilators or openings; however, they encountered practical issues, such as rats entering the house through these openings. Consequently, many residents blocked the ventilators, making their provision for air movement redundant.
  - Traditional houses often feature semi-public spaces, such as verandas in the front and backyards, which are heavily used. Even if the initial design cannot fully incorporate these spaces, there should at least be provisions for future expansion.
  - Beneficiaries preferred separate bath and WC facilities over combined units, which aligns better with their cultural practices.
- **Suggestions:**
  - Include cultural considerations in design workshops to ensure designs align with beneficiaries' preferences and practices.

vi. Insufficient Emphasis on Climate Responsiveness:

- **Field Insights:**

- Beneficiaries often questioned why certain technologies were only suggested for social housing or Economically Weaker Sections (EWS) housing. There is a misconception that these technologies are not used in other contexts.

- **Suggestions:**

  - **Promote Climate-Responsive Technologies:** It is essential to educate beneficiaries that these technologies are widely used in various national projects, including Tamil Nadu. Visual presentations, expert interactions, and showcasing examples of projects where these technologies have been successfully implemented can help convince beneficiaries of their value. Efforts should be made to demonstrate that these materials are also preferred by wealthier individuals, as well as for community and public buildings.

  - **Directory of practitioners and agencies:** The Tamil Nadu government should create a directory of practitioners specializing in sustainable construction methodologies to enhance housing schemes for the poor. This directory will help connect experts with projects, improving construction quality and sustainability.

vii. Additional observations

- **Field Insights:**

  - Reusing building materials, such as old doors, windows, wooden rafters, and tiles, can be beneficial and is a practice that some beneficiaries are already familiar with.

- **Suggestions:**

  - **Highlight Material Reuse Benefits:** Encourage and highlight the benefits of material reuse within PMAY-G guidelines to support sustainability and cost efficiency.

In addition to these observations, it is essential to examine the traditional houses of Tamil Nadu. This will enhance our understanding of the housing preferences of residents from earlier times and provide valuable insights into the materials and construction practices used.

4. Learning from vernacular and traditional houses

Fig: Dakshina chithra, Chennai

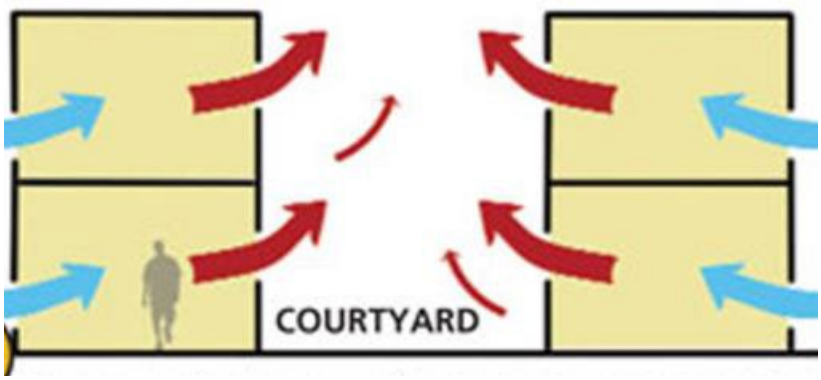
source: https://www.tamilnadutourism.tn.gov.in/destinations/dakshinachitra-chengalpettu

There are many important lessons that one can gain from observation of traditional house types and vernacular architecture and how they adapt to the prevailing climate as well as to the social and functional needs. Introduction of these features to the extent possible in the houses constructed as a part of social housing programs for the poor will enhance the appeal and sense of ownership for the end users it will add character and also a sense of emotional comfort. For example, the semi-public entry space called THINNAI is characteristic of most rural houses in Tamilnadu.

Fig: Typical rural house showing Thinnai with use of wooden columns & half round country tiles

source: www.skyscrapercity.com

Fig: Airflow in a courtyard



Source: https://www.birlaa1.com/net-zero-energy-buildings.html

Fig: Courtyards & covered passageways

source: www.stockpicturesforeveryone.com

Courtyards & covered passageways are typical features of traditional and vernacular architecture of Tamil Nadu. A courtyard enhances air circulation through principle of stack effect (air movement driven by buoyancy). After the air passes through the interiors it heats up and starts rising. The courtyard allows this air to escape. They also help in Natural light entering the house, intensity depends on span of the courtyard opening.

It is commonly seen that houses are oriented N-S or E-W and the size of the openings differ depending on the climate of the particular location. Southern & Western walls are shielded by verandas to reduce the harsh heat and light.

Based on the preceding understanding of the challenges faced in the implementations of the housing for the poor schemes we have formulated few suggestions regarding KKI guidelines which will be discussed in the following section.

2. Observations on KKI guidelines

The KKI guidelines have been perused and the following suggestions have been offered:

a) Section 5: Type design and Unit Cost;

i. In the point number iii, The houses shall be constructed as per the type designs to be provided by the department.

The houses 'shall be' constructed maybe modified to read 'May be' since the type designs are only indicative and can be modified by each beneficiary to suit their requirements provided basic design guidelines and minimum standards are followed.

ii. In point number v: The walls of the houses should be constructed using country bricks/ solid blocks / interlocking blocks / AAC blocks with framed structure using cement mortar.

Framed structure is not required in the case of load-bearing masonry buildings which can easily be built for ground plus three storeys. Small scale buildings with small room sizes and small spans of rooms do not require corner strengthening in the form of RCC columns. A framed structure, that is concrete columns, is only needed

- In the case of buildings in the high seismic zones where both horizontal and vertical ties are needed as an earthquake resistant measure. In the case of Tamil Nadu since the entire state falls in Zone 3 & Zone 2 both of which do not require vertical and lateral seismic strengthening as per the classification and building codes, this requirement is redundant for small houses built in the state of Tamil Nadu
- Columns would be needed in G+2 storey structures only in cases where the building needs to be a multi-utility space with a very large spans which is not applicable in the case of small houses.
- Further it is pertinent to note that in the entire state of Tamil Nadu we have excellent examples of iconic buildings such as for example the Rippon

Buildings, Chennai which are all multi-storey load bearing structures without columns/pillars which have withstood the test of time beautifully.

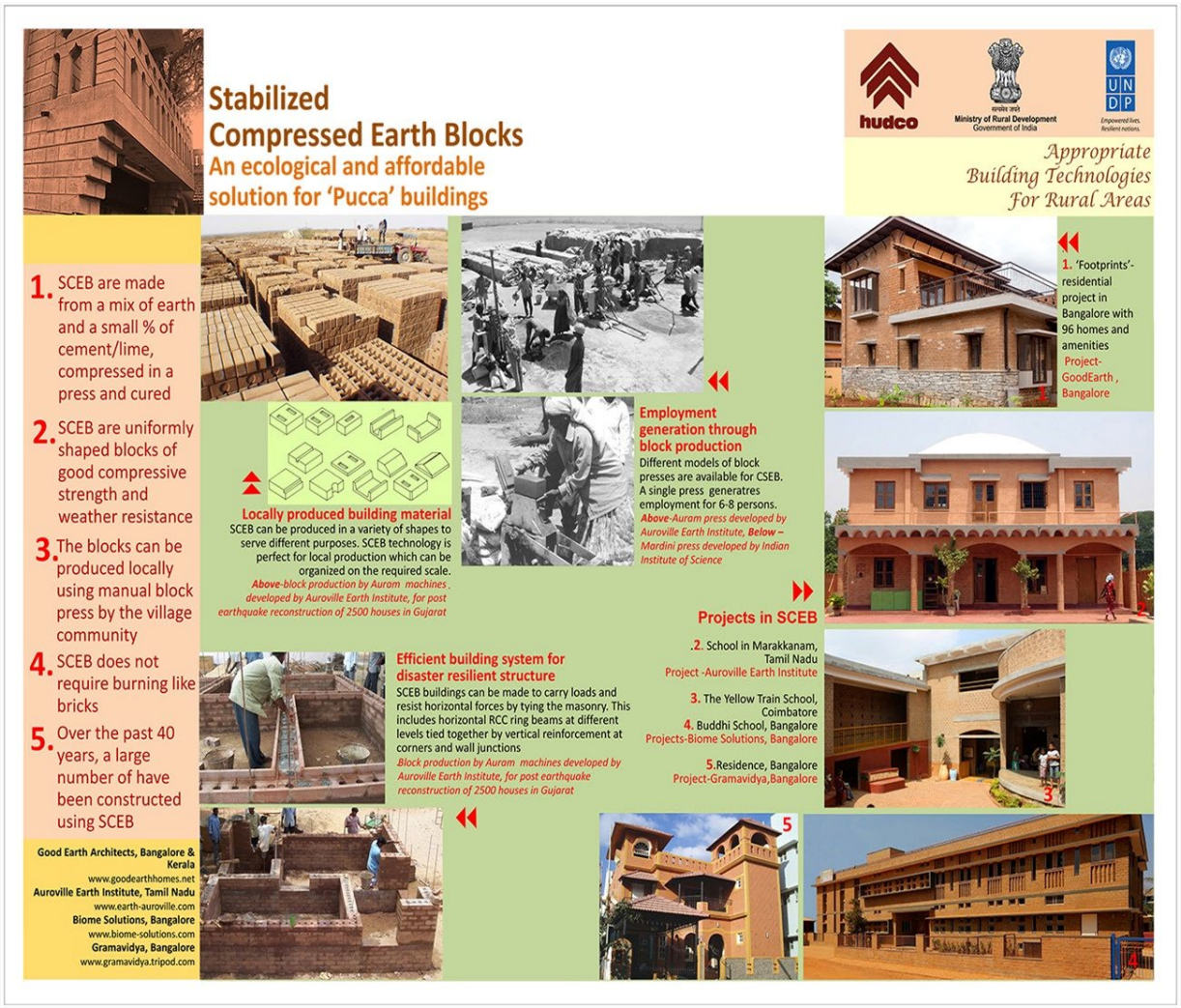
- The addition of columns means an addition in the quantity of concrete, this adds unnecessary costs to the buildings which is highly avoidable. It also breaks the rhythm of the construction of a small house since the construction of the walls has to be stopped in order to do the scaffolding, pouring & curing of concrete, which requires a minimum of two weeks adding to unnecessary construction delays.
- In addition, frame structure means the addition of columns which is an unnecessary construction delay.

iii. In the Point number vi – The construction of mud wall is completely banned

This sentence maybe reviewed since there are many cost effective technologies where improved forms of mud – earth are used with no compromise either on quality or on aesthetics. This is also at variance with point 7 in the same section, since many cost effective technologies use earth in different ways such as compressed stabilised earth block (CSEB), Stabilised Mud Block (SMB), Compressed earth block (CEB) etc.

In fact, the use of mud in construction has come a long way from the late 1980s when the concept of stabilised earth blocks was first introduced by the Indian Institute of Science, Bengaluru. Today there are IS codes for these technologies which are extremely popular in several parts of the country particularly in south India. The poster given below was prepared as a part of information dissemination to show the versatility and acceptance of earth as a walling material across all categories of buildings.

Fig: Poster on Stabilised Compressed Earth Blocks



Source – UNDPMoRD HUDCO project on green housing

E. Developing context-specific climate responsive Housing for the poor in rural areas: Key approaches.

1. Key aspects of the proposed approach

Rural housing goes beyond the mere provision of built units, it is a process which has a far-reaching impact on many stakeholders. A massive programme like KKI and similar programmes present a unique opportunity to bring about a robust change in perspective, which will directly positively impact the lives of the end-users.

Source: Development Alternatives

Habitat for the poor is:

- A shelter
- Physical and social security
- A work place
- Social position
- A means of livelihood
- A market for products and services

Source: Kirtee Shah

It is possible to make incremental improvements to the central product- the house itself. Improvements can be made to design, size, artistry, cost optimisation, space efficiency, climate considerations, localisation, functional diversity, services, aesthetics, etc.

Improvements can be made to the programme process- beneficiary selection, participation and sense of ownership, facilitation of beneficiary choice of design, materials and technology.

Improvements can be made to the social aspects of the programme- social capital formation, dignity and realisation of self-worth resulting from responsibility sharing and delivering, co-working and coordination.

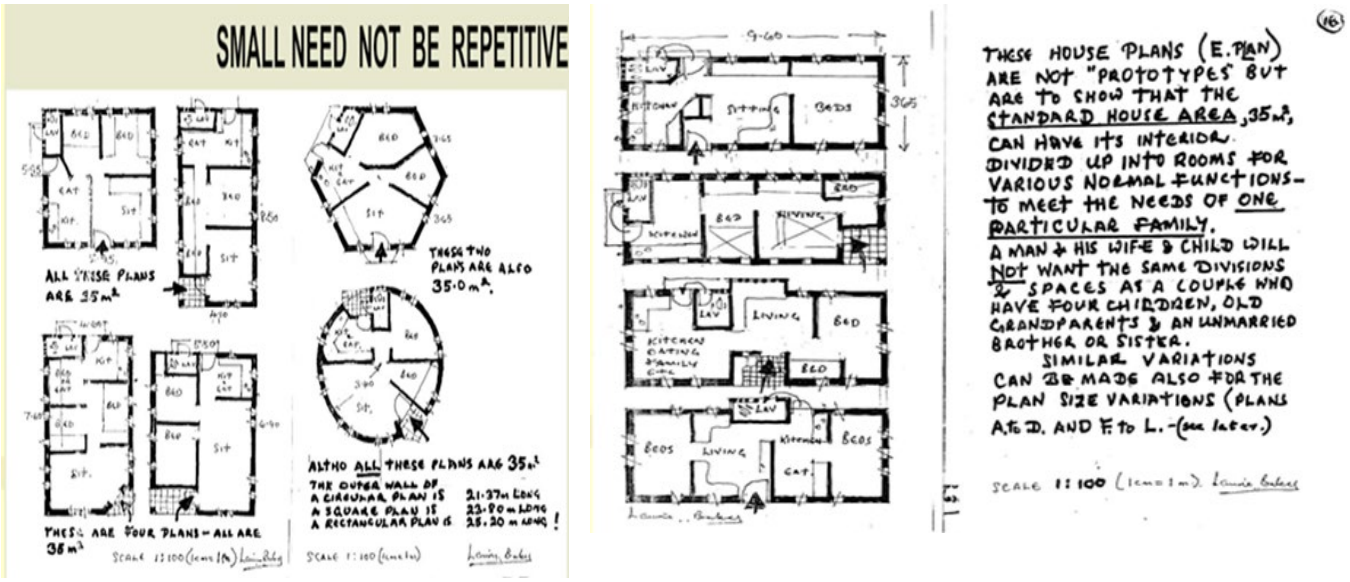
Positive externalities of the programme, not planned for in its design, can be highlighted- the value of the investment to non-beneficiary villagers, impact on village economy, and implications for employment (direct, indirect, long term, short term).

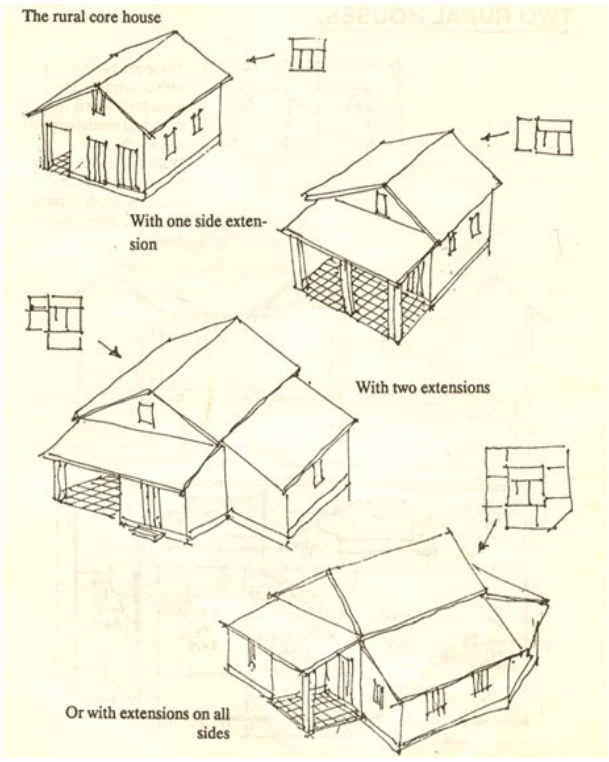
Any approach to rural housing should take cognizance of the backward and forward linkages and a well designed intervention would directly impact in a positive manner the quality of life of the targeted beneficiaries.

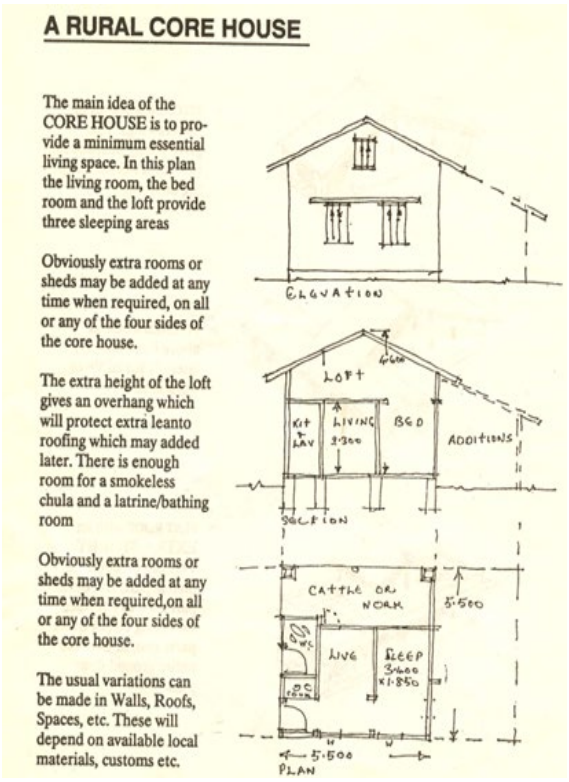
a) Importance of Design-

One essential aspect that is often overlooked is design. Contrary to popular understanding, the challenge of designing small spaces with limited resources is where design skills need to be put to best use. The project hopes to demonstrate how, within the constraints of space and resources, the spaces can still be customised according to the specific needs of the beneficiary families. In large-scale social housing programmes, it is essential to move away from a single-type design and have options for the beneficiary family. The best examples, and there are several good housing projects all over the country, are where designs are evolved in a participatory manner along with the beneficiaries. Laurie Baker's ***(Refer Box 2)*** simple sketch of several designs for the same 35 sqm illustrates this point very well. There are also case studies where participatory design approaches have resulted in the beneficiaries' satisfaction, acceptance & complete sense of ownership.

Fig: Sketches by Laurie Baker



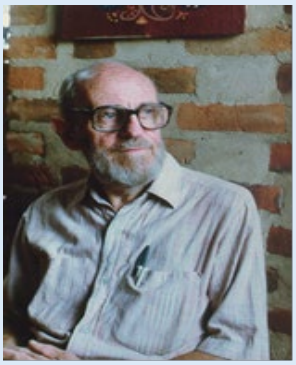




Source: Sketches by Ar. Laurie baker from the book 'A Manual of cost cuts for strong acceptable housing'

Box: 2- Laurie Baker: the doyen of appropriate housing

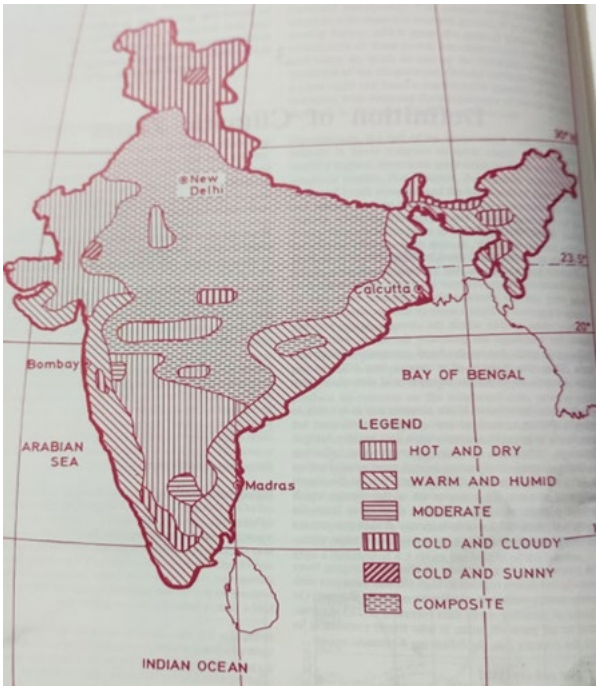
No discussion on rural housing in India can perhaps be complete without highlighting the exemplary work in this field by **Padmashree architect Shri Laurie Baker.** Shri Baker, of British origin came to India in the early 60s, and settled in Kerala where he lived and built for most of his life. Baker, through his massive volume of work, has demonstrated beyond a doubt that alternate approaches to the question of housing are very much possible where the home owner, the culture and functional requirements of every family are at the heart of the intervention. Importantly, the techniques are as cost-effective as the buildings are aesthetic. A master craftsman and an artist, his sketches speak better than words, and some of them have been reproduced here, specifically his easy demolition of the concept of a 'type design' for a house and his illustration for planning incremental houses.



Picture Credits: R.S Iyer

b) **Climate-Responsive Designs:** Climate-responsive architecture prioritizes the design of buildings that optimize energy use according to local climate conditions. Effective strategies include maximizing natural lighting, enhancing ventilation, and utilizing thermal mass for heat regulation. By focusing on passive design elements—such as building orientation, shape, window placement, and shading devices—natural light can be optimized, reducing reliance on artificial lighting.

Fig: Climatic Zones of India



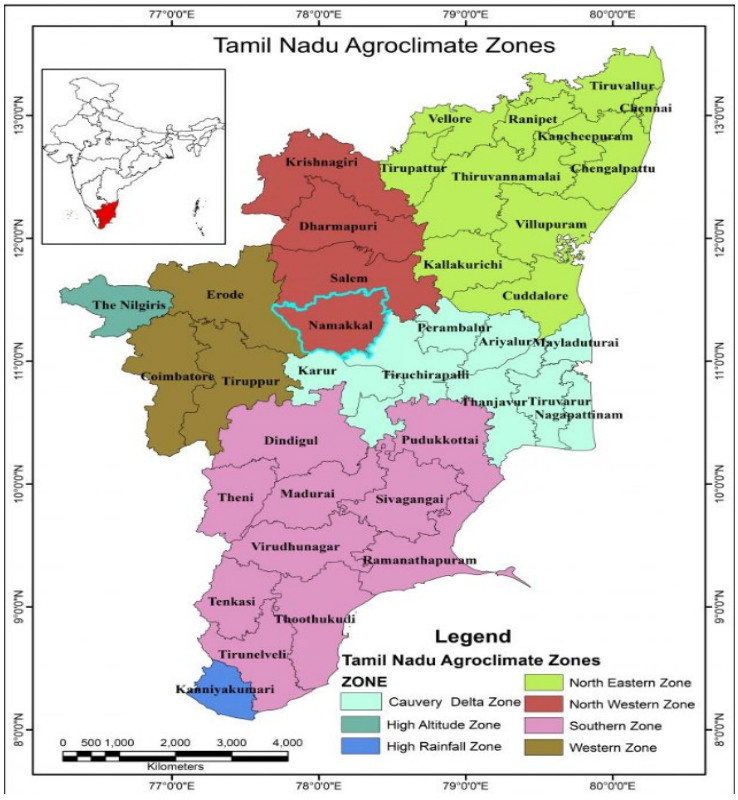
Source: Climatic zones and rural housing In India, German-Indian cooperation in scientific research and technological development, edited by N K Bansal and G Minke,1995

1. Hot and dry
2. Warm and humid
3. Moderate
4. Cold and cloudy
5. Cold and sunny
6. Composite

There are several ways of classifying climatic zones; one of India's earliest and standard zoning was done by Gernot Minke and NK Bansal in 1995, considering six principal climatic zones. As is evident from the map, TN is classified as having a warm and humid climate in the coastal regions, hot and dry in the inland districts, cold and cloudy only in the Nilgiris and moderate in a small area of Krishnagiri district which falls in a small geographical area influenced by the Western Ghats

Agro-climatic zones in Tamil Nadu: In Tamil Nadu, the land area has been classified into seven Agro-climatic zones based on soil characteristics, rainfall distribution, irrigation pattern, cropping pattern and other ecological and social factors. Detailed information for each of these districts on all these parameters is available and can be referred to as needed while doing the site planning, foundation design and other related aspects.

Fig: Agro Climatic zones of Tamil Nadu



Source: https://tnau.ac.in/tamil-nadu-agro-climatic-zones/

Beyond these foundational elements, it is also crucial to consider environmental hazards that can impact construction and habitation. These hazards, such as wind vary significantly across the state and must be integrated into design and construction practices to ensure resilience and safety. By acknowledging both the agro-climatic characteristics and potential hazards, we can

develop a more comprehensive approach to designing and constructing housing that is both climate-responsive and hazard-resilient.

c) **Participatory Design Process:** Designs should be created in collaboration with the end users, ensuring their involvement. This has also been emerged as an important aspect in the study of post-tsunami housing by IIT Chennai (***Refer box 3)***

d) **Strategies for knowledge sharing and improving acceptance:** It is once again reiterated that both the information as well as use of all the technologies being proposed is not new and they have been advocated for adoption with no compromise either on quality on own strength. The gap has probably been in reaching this knowledge to the end users and the pilot proposes a set of a capacity building strategies for the same.

e) **Using Information Technologies to advantage:** A critical component of the proposed pilot action is the convincing of beneficiaries. The use of computer-aided animation, 3-D visuals for prototype houses etc. will be made use of to give end users a realistic idea of spaces, volumes and appearance.

f) **Livelihood linkages:** Opportunities for linking the production of building components with Self-Help Groups (SHGs) will be explored, creating viable livelihood options and benefiting the local economy. An example can be barefoot architecture which is elaborated below **(*Refer Box 4)***

g) **Tapping the potential of existing practitioners and agencies using appropriate technologies; Building a directory:** Efforts for the dissemination of cost – effective construction technologies started over three decades ago in the seventies. HUDCO was at the forefront of these efforts, supporting the Government of India in the program for setting up of a 'National Network of Building Centres'. Building Centres were perceived as 'agents of transfer' of alternative building technologies from the lab to the land. During the eighties till the first half of twenties the building centre movement grew rapidly and over six hundred and seventy-four such centres were set up all over the country. In Tamil Nadu too 'Kattida Maiyams', as they were called were active during this period, particularly in spreading the use of concrete products which are a part of everyday construction today. These and other efforts have resulted in the spread of both knowledge and interests in a range of environment-friendly technologies. Today there are over three hundred practitioners and organisations working with these options in all parts of the country. In Tamil Nadu too, it is guesstimated that there are 50-75 practitioners, many of them young architects, who are building for middle and high-practtiotioners building a

variety of buildings, ranging from middle and high income houses, schools and institutional buildings, entire sustainable housing complexes,etc ,using a variety of technology options. These practitioners can be coopted in the efforts of Government of Tamil Nadu for the spread of skill and knowledge of the selected technology options. Showcasing their work will also help in gaining acceptance and popularity amongst the target groups of poor beneficiaries who are likely to be influenced by their adoption by richer communities. Compilation of a directory of these practitioners would be an extremely useful tool both for the Government as well as the public.

Box 3: Excerpts from study on housing and rehabilitation of tsunami victims in Tamil Nadu, India, by Prof. Prem Rajagopalan and Prof. Ravindra Gettu

Literature on post disaster housing has been emphasizing the need to promote an 'owner-driven approach' rather than a 'contractor-driven approach' to Housing and 17 Reconstruction. Our study has shown the possibility of including 'user participation' in a 'contractor-driven' or 'agency-driven' effort at housing reconstruction and rehabilitation. While critics may say that 'user-participation' in the cases discussed above are not at the higher level of decision-making, when one analyses the responses on both the house and the settlement, no major difference seems to emerge between those sites that included the community and those that did not. However, the following inferences can be made which should be noted in any future disaster reconstruction activity. (1) No education/orientation on the new house-materials or technology was given to the beneficiaries. This will affect future maintenance. Instances of tampering with the electricity line, short circuiting etc., were recorded within six months of occupation. (2) Insufficient provision for expansion has been provided – especially on the terrace to facilitate covering by thatch or any other material. (3) Flexibility in the provision of fittings and interiors has created new hierarchies amongst settlement. This is observed significantly where 3 NGOs have reconstructed houses in a single settlement – varying in finish and provision of fittings. Allotment has led to minor conflicts within the community. (4) Inspite of community participation, the cultural needs of the users are not addressed – for example – a bath & toilet together is not acceptable this is not used wherever alternative space is available. No pooja room has led to minor alterations. Kitchen is used for storage and other purposes as an open kitchen is preferred due to the nature of fuel used. (5) While communities were mobilized during construction, no activity is visible in post-habitation maintenance – for example disposal of waste. Committees formed during construction have been dissolved. (6) Where agencies were involved that did not have a prior base, the people are left high and dry with respect to voicing their complaints as they have left the site once construction was over. Many of them do not have their insurance papers (which was necessary for the agency to get a clearance certificate from the collector etc) and have no clue about the 'ownership papers' for the house.

Source: Housing And Rehabilitation of Tsunami Victims In Tamil Nadu, India Prema Rajagopalan & Ravindra Gettu[i]

Box 4: Barefoot Architecture in Construction

Barefoot architects refer to local artisans, masons, and builders trained in using cost-effective and sustainable building techniques. These individuals typically belong to the communities they serve, making them familiar with the local geography, climate, and cultural needs.

Benefits:

They help in building low-cost structures using locally available materials like mud, bamboo, stone, etc.

They are adept at integrating traditional architectural styles that resonate with the community's way of life and environmental context.

Barefoot architects offer an approach that can be scaled across villages with minimal technological dependencies, empowering communities with self-sustained housing solutions.

Role of SHGs (Self-Help Groups) in Housing and Construction:

SHGs, can be trained in using cost-effective and sustainable building techniques, Since they belong from the same community , making them familiar with the local geography, climate, and cultural needs.

Construction Involvement:

SHGs can be trained in low-cost housing techniques and participate in construction activities. Their involvement can reduce reliance on external labour and costs.

The technical staff can coordinate with SHG to help build affordable housing that aligns with the community's socio-cultural dynamics.

They can also facilitate microfinancing options for housing schemes, making housing loans more accessible to low-income groups.

Benefits:

- Engaging SHGs in housing empowers women in the community by providing them with skills and income-generating opportunities.
- SHGs can act as intermediaries, ensuring better implementation and beneficiary feedback in housing schemes.

h) **CSR Fund Utilization:** Corporate Social Responsibility (CSR) funds will be explored to support housing for people particularly for homeless families given the rising cost of construction the entire cost of the dwelling unit cost cannot be met with the subsidies alone. Possibilities of gap fundings can be explored through CSR and other funds of corporates and philanthropic organisations. There have been several examples of successful partnerships of these agencies as for example Post – Tsunami rehabilitation in Tamil Nadu.

i) **Incentivisation:** Many of the technologies proposed use lesser quantities of capital and energy intensive materials such as cement and steel. The use of more environment friendly options and reduced use of the high energy materials can contribute to the lowering of carbon footprints and hence to States commitment to the related SDGs. Incentivisation for the use of these technologies can be considered as a strategy to promote their use while earning carbon credits.

2. Appropriate construction technology

As climate responsive construction is a main point in our key approaches, it is also important to understand the role of alternative technologies and their advantages which is discussed below.

Fig: Rationale for Appropriate technologies

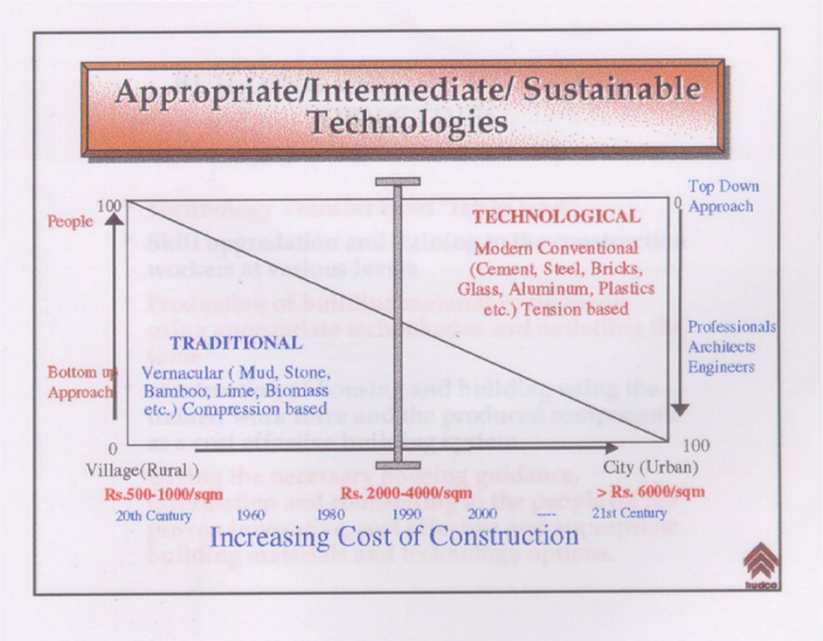


Figure credits: Shri. V Suresh, Former CMD, HUDCO

The figure above represents the rationale for the adoption of cost-effective environment-friendly technologies. At one end of the spectrum, we have the set of options which are often found in rural areas starting with organic materials like mud, bamboo, thatch, lime and at the other end we have modern materials such as steel, glass, concrete etc. more common in urban areas. In terms of construction systems, the spectrum also moves from ancient compression-based structures such as arches, domes and vaults to tension-based structures like beams and columns which were conceived after the invention of steel and concrete

The idea of appropriate technology has never been to say that everything old or natural is good or that everything modern is bad, but to adopt an approach where a judicious combination of traditional and modern is adopted in the context of specific conditions at the site in question. The slide rule in the figure above represents the idea that the combinations may vary depending on the context to arrive at what is considered appropriate. It therefore does not mean no use of concrete but rather an optimal use of concrete. One example can be seen in the traditional I Beam and stone slab roof construction popular in large parts of North India, where a simple modification is the replacement of the now expensive iron I Beam with a partially pre-cast concrete T Beam. This is a popular and contemporary adaptation of the old technology. Similarly, mud as a building material has been used for over a thousand years. Materials such as compressed stabilised earth blocks (CSEB) and Compressed Earth Blocks. (CEB) and improved rammed earth construction all represent techniques where the inherent disadvantages of mud have been addressed with technology and innovation to create improved and sustainable environment-friendly building materials.

a) Advantages of appropriate technology

i. **Cost:** The selection of the right building materials, techniques and building components can contribute to cost reduction, approximate quantification of the savings achieved has been tabulated in the technology section which follows. In some techniques such as the rat trap bond and for walling and the filler slab for roofing, as well as the use of building elements such as pre-cast ferrocement for sunshades and built-in shelves, costs are reduced because of optimal use of the materials with no compromise on either quality or strength. Overall cost reduction can also be achieved by taking significant decisions such as doing away with external and internal cement plasters for the walls, reuse of old doors and windows, roofing tiles, steel and wooden rafters etc.

ii. **Ease of Access and Maintenance:** The use of building materials which have been in the community for centuries also means that the end users are very comfortable with

both its use and its ease of access. The contrast of using more modern materials often results in poor quality because of the lack of proper know-how and skills. This also holds true with respect to O&M of the materials used for construction. In this sense, repair of a poor quality / leaking concrete roof is not something the villagers can address by themselves, as some level of technical expertise is required to address the problem. In contrast, in the case of broken roofing tiles to be replaced they do not have to depend on external help

iii. **Ease of Living:** Ease of Living is understood as improved well-being of citizens since the end goal of development is to improve liveability. The adoption of natural and climate-responsive materials which give better thermal performance and context friendly designs in tropical climates such as ours contribute to better liveability

iv. **Aesthetics:** The use of exposed brick masonry, whether the building materials are fly ash or burnt bricks and the addition of small features such as the traditional 'Thinnai'or Verandhas with wooden or stone pillars and small sloping roofs would contribute to the aesthetic appeals of these small houses. This would be a significant departure from the commonly perceived visualisation of the Government social housing program where the same type of designs all of which appear identical are not visually appealing to the end-users.

Fig: Mamana ooru , Attapadi

source : Laurie Baker Centre

Fig: Houses built under PMAY-G

Source: varmaopinon.blogspot.com/2018/08/pradhan-mantr
yojana-g

v. **Greening:** It is important to recognise that many of these alternate material options can contribute in a significant way to the greening of rural housing. As mentioned earlier most of the traditional materials are bio-degradable and therefore environment friendly. In addition there are a large number of waste-to-wealth options such as Fly ash blocks and Fal-G Blocks which is made from fly ash, lime and gypsum, all of which are industrial waste products. Similarly, debris blocks which are made from Construction and Demolition waste (C&D waste) are another excellent example of waste to wealth.

vi. **Retrofitting:** Retrofitting as a concept needs to be highlighted both in the construction of houses and in larger buildings. Major savings can be achieved by reusing doors and windows taken from demolished buildings, repurposing of old woods, innovative uses of waste materials such as use of discarded steel for grills and gates, reuse of roofing tiles etc. This strategy needs to be focused on in addition to the proposals for recycling construction and demolition debris which is elaborated in the technology section.

3. Alternative technologies suited for Tamil Nadu

As we have understood in the previous section about the importance of alternative technologies, we are exploring several alternative technologies suited for Tamil Nadu, focusing on wall and floor slab construction methods that can address regional challenges and improve construction efficiency

a) Technologies that can be used for walls:

i. FLY ASH BRICKS- (IS 12894:2002)

Fig: Mongia School, Giridh, Jharkhand

Photos – Ar. Anup Rangole

Fly ash is a byproduct of coal combustion in thermal power plants. Its utilisation as a raw material for brickmaking will be a very beneficial solution regarding economic and environmental aspects.

FAL-G bricks are made of fly ash, gypsum, lime & sand. These can be extensively used in all construction activities as an alternative to burnt clay bricks with the exact dimensions, i.e., 23 x 11 x 7.5 cm.

Dr. N. Bhanumathidas and N. Kalidas invented Fal-G Technology in 1990, where they promoted a scientific NGO outfit called the Institute for Solid Waste Research & Ecological Balance (INSWAREB) to catalyse the proliferation of the fly ash brick industry. Over 500 MSMEs have been manufacturing Fal-G Bricks across Tamilnadu, lifting fly ash from the Thermal Power Stations in Chennai, Mettur, and Tuticorin.

- **Availability** – In Tamil Nadu Fly ash are mostly sourced from Ennore, Mettur, Tuticorin & Neyveli thermal power plants. Fly ash from the power plants are transported to most of the districts in Tamil Nadu and bricks are manufactured locally.

- **Manufacturers** - Tamil Nadu Fly Ash Bricks and Blocks Manufacturers Association (TNFABBMA) was formed in 2006 at Coimbatore with the support of Mr. M. Gunasekar, Proprietor, Engineers Enterprises, Coimbatore with 14 members. The Association has Mr. D.S. Saravanan as its Founder President and its registered office is at No.33, Acharappan Street, Chennai - 600 001. The Association was registered at the Chennai registrar office (Regn. No. 212/2006). For administrative convenience, they operate in three zones namely Chennai, Tuticorin, and Mettur. Around 300 manufacturers are registered as members of this association.

- **Cost** - At Chennai cost of a fly ash brick including the transportation is 8.rs

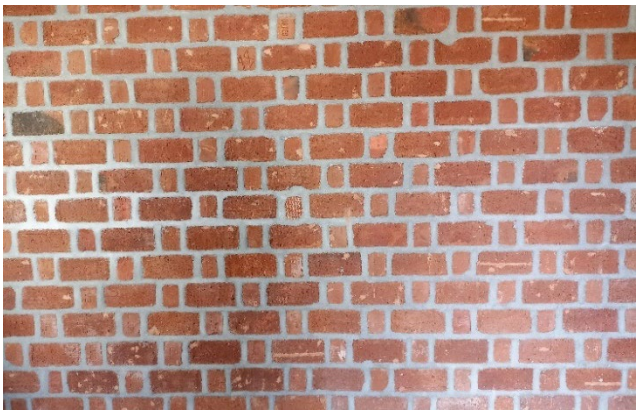
- **Compressive Strength** - It has a compression strength of 7.5 N/mm2 equivalent to that of burnt clay brick, thus with appropriate design and structure fly ash bricks can be used as load bearing walls.

- **Suitable districts** – Because of its easy availability, fly ash can be used in most of the districts in Tamil nadu

ii. Rat trap Bond

Fig: During Construction

Fig: After construction



Photos- Ar. Dhanaseelan

Rat trap brick bond uses 400 bricks per m3 as compared to 500 in conventional masonry, also saves mortar. Creates better thermal comfort due to cavity. The masonry can be left exposed, reduces cement plastering which gives an aesthetic finish. This technology is tested and validated for 2-storeyed load bearing construction by Anna University. Since this is a labour intensive work 10% extra wages are spent. Overall there is a reduction of 10 – 15% of cost of the wall compared to the construction with Flemish or English bonds.

iii. Interlock blocks – CSEB (IS 1725-1982) & Flyash Interlock

Fig: CSEB Interlock blocks

Fig: Fly ash Interlock blocks

Photos – Ar. Dhanaseelan

Interlock masonry for constructing wall are largely dry stacked or using minimal mortar where ever necessary. These interlocking blocks have tongue and groove profile on 4 faces of block that helps auto fix among the blocks which enhances structural stability, thus reducing the requirement of mortar. This technology is a fast construction saving upto 25% in the labour cost. Interlock blocks are made by mixing earth or fly ash with stabilizers like cement or lime and compressed in a machine. Both CSEB and fly ash interlock are available in the market with dimensions – 20cm or 15cm X 25 cm X 12.5.

- **Availability** – With the purchase of the interlock block machines, blocks can be made on site if good quality of earth is available. If not there are manufactures around the

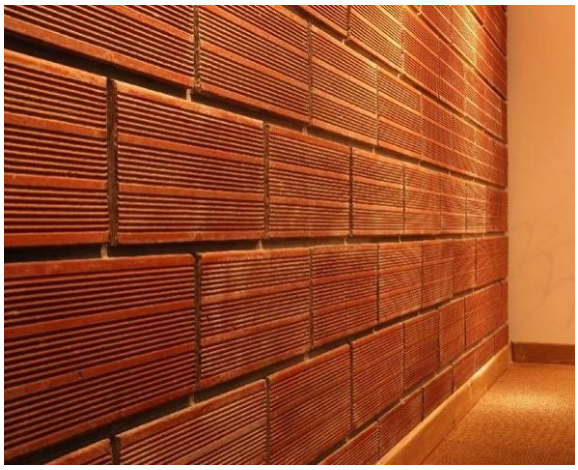
districts who supply blocks against the orders. There are few CSEB manufactures in the following districts of Kerala & Tamil nadu – Chennai, Thiruvarur, Villupuram, Salem, Erode, Trivandrum, Trissur, Palakkad & Malapuram.

- **Cost** – CSEB interlock block cost varies from 45.rs to 60.rs for different districts based on availability & its transportation
- **Compressive Strength** – Depending on the soil type, percentage of stabilizer mixed compressive strength of CSEB varies from 4 N/mm2 to 10 N/mm2
- **Suitable districts** – CSEB can be used in any part of the state with appropriate designs

iv. Hourdi blocks - (IS 3952-1988)

Fig: Vertically perforated Porortherm

Fig: Horizontally perforated Porortherm



Source: www.wienerberger.in

Hourdi blocks are hollow burnt clay blocks with 3 different dimensions 20 cm or 15 cm or 10 cm X 20 cm X 40 cm. This is an enhanced version of regular burnt clay bricks with better thermal insulation by the air cavity and fast construction due to its larger size.

- **Availability** – Manufacturers of porotherm blocks near tamil nadu are mostly from Bengaluru and North Kerala

- **Compressive strength** – This blocks are light weight easy to carry and comes in 2 variations – Load bearing Vertically perforated with 7 N/mm2 & Non Load bearing Horizontally perforated with 3 N/mm2.
- **Cost** – At Chennai cost of a Hourdi block is around 100.rs
- **Suitable districts** – Based on the availability and cost, it can be used in the districts near Bengaluru and North Kerala. It is recommended for use in places with high temperatures since the air cavity provides thermal insulation.

v. Precast Concrete panels

Fig: Precast concrete panels fixed to the concrete pillars

Source: VRK enterprises

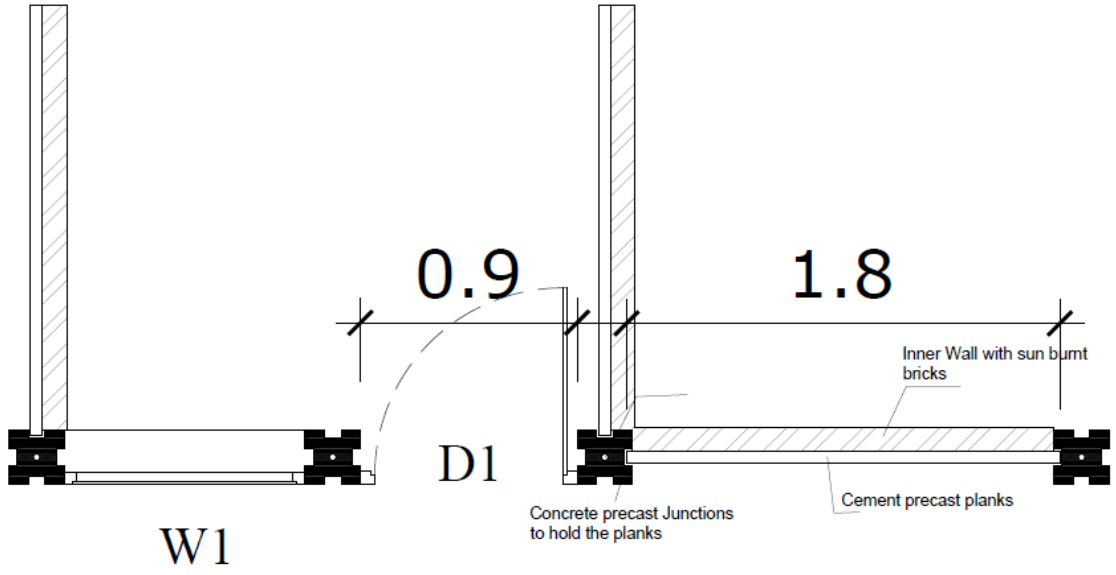
Fig: *Shankar Kanade's design reference.*

Source: replito.de

Prefabricated wall units are designed to simplify construction and improve efficiency. This modularity allows for quick assembly on-site and ensures high-quality control during the manufacturing process. Wall units are manufactured off-site in a controlled environment. This process includes assembling the core structure, adding insulation, and applying finishes.

Prefabricated units are transported to the construction site and assembled using human power. This method reduces on-site construction time and minimizes waste. The wall system is designed to integrate seamlessly with traditional construction methods, including foundation

Fig: Floor plan representing the Precast concrete panels and pillars on the exterior and brick walls in the interior.



Drafted by Ar.Dhanaseelan

work and roof installation. This requires careful coordination between modular and conventional construction techniques.

- **Availability** – These concrete panels are available in every districts most commonly used for Precast compound walls, predominantly seen in urban areas. The Pillars to which the panels are fixed are pillars made of cement concrete blocks which can be manufactured by any precast concrete vendors.
- **Cost**- 10% less in cost when compared to construction with burnt clay bricks
- **Structure** – The Loads are transferred to pillars made of cement concrete blocks, M20 – 20 N/mm2 with proper curing for 28 days. (IS 456: 2000)
- **Suitability –** Can be proposed for all the districts.

vi. Precast Concrete Stone Masonry Blocks (IS 12440-1985)

Concrete stone masonry blocks are a precast cement concrete solid blocks having stone Or brick pieces or construction & demolition waste (CND) spalls 30-40 % of volume and

cement concrete with dense stone aggregate & sand. Can be used for foundations and walls. It is Validated by BMTPC, IS 12440-1985

.

Fig: Fill the stones 50-70 mm in size. Fill in lean concrete in between the stones and compact with plate vibrator

Fig: EWS housing by Awas Vikas Sansthan , Jaipur

Fig: Nizamuddin building centre, Delhi.

Source: Laurie Baker Centre

Fig: Dimensions of Blocks

Table 1: Dimensions of Blocks

Nominal Size (mm)			Actual Size (mm)			
Length	Breadth	Height	Length	Breadth		Height
100	100	150 200	150	90	90 140 190	140
150	100	150 200	150	140	90 140 190	140
200	100	150 200	150	190	90 140 190	140
225	100	150 200	150	215	90 140 190	140
300	100	150 200	150	290	90 140 190	140

Source: BMTPC

Fig: Compressive Strength of the Debris block

Table 2 : Compressive Strength of Blocks

Class Designation	Minimum Average* Compressive Strength of Blocks kg/cm²	Minimum Strength of Individual Blocks kg/cm²
50	50	35
60	60	42
70	70	50
90	90	63
100	100	75

* For 100mm wide blocks (for 100mm thick walls) the minimum strength may be 35 kg/cm²

Source: BMTPC

b) Alternative Technology that can be used for Floor Slabs

i. R.C.C Filler slab

Fig: Filler slab Casting with MP tiles as Filler

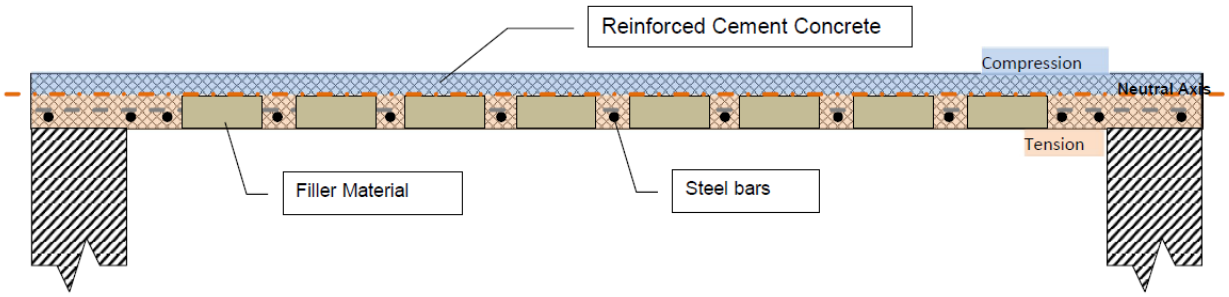
Fig: Final finishing of Filler slab

Photos : Ar.Dhanaseelan

Reinforced Cement Concrete (RCC) slabs, in which redundant tension zone concrete is substituted with non-structural filler materials, are termed Filler Slabs. This is usually effected by

introduction of terracotta tiles or other appropriate filler materials, between steel bars, in the bottom portion (tension zone) of RCC slabs. Its structural behaviour is similar to that of RCC slabs.

Fig: Schematic diagram representing R.C.C Filler slab



Source: Documents from LBC

- **Availability** – Availability of Filler materials vary place to place. In Tamil Nadu MP tiles, Coconut shells, Earthen pots/ pans, bamboo, bricks etc are available as filler materials.
- **Cost** - This will reduce its material usage by about 25% when compared to Conventional R.C.C slabs
- **Strength** – It has same strength as regular R.C.C slab.- M20 Concrete (IS 456: 2000)
- **Suitability** – With user needs, slab is designed and can be is used wherever a conventional R.C.C is casted

ii. Hollow clay tiles or Hourdi blocks slab (IS 3952-1988) -

Fig: Hourdi blocks and channels available in the market of Kerala & Bangalore

Source : https://dev.earth-auroville.com/hourdi-roofing/

https://www.baliapatam.com/

Hourdi blocks, or hollow clay blocks, are laid between the precast T joists resting on the wall. Shuttering works are not needed for this technology. Hourdis are lightweight & thermally insulated. This technology increases construction speed and reduced material usage thus saving up the cost by 10%.

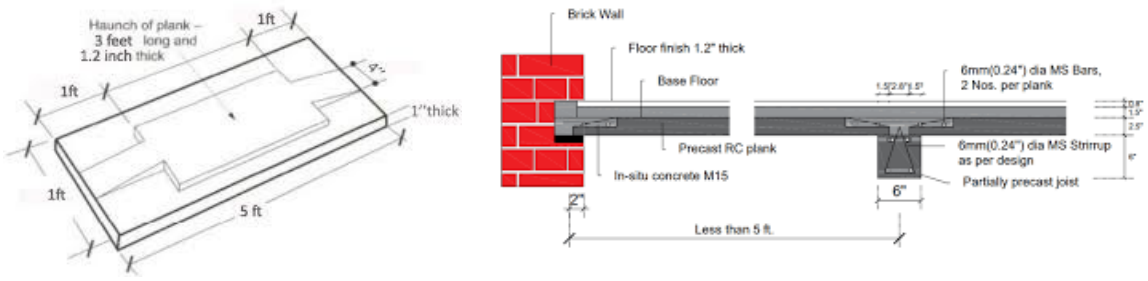
- **Availability** – Manufacturers of Hourdi blocks near Tamil Nadu are mostly from Bengaluru and North Kerala
- **Cost** – At nearby districts from the manufacturing, it is available at a cost of 75.rs and overall system will reduce the slab cost by 8%-10% from conventional RCC slab
- **Suitable districts** – It can be used in the districts near Bengaluru and North Kerala based on availability and cost.

iii. Precast RC planks and joists for floors & roofs - (IS 13990: 1994:

Fig: Placements of RC Planks & joist

Fig: P.C.C screed poured to level.

Fig: Schematic representation



Source: BMTPC

Precast reinforced cement concrete (RC) planks are partially precast rectangular slab elements. These are supported over partially precast RC joists side by side and then joined together and also to the joint by pouring in-situ concrete over the haunches provided in the planks and gaps between the planks over the joists. Monolithic action of slab elements is ensured by leaving hooks projecting out of joists & providing reinforcements across the joists over haunched portions of planks, tying them together and pouring in-situ concrete over them.

- **Availability & Suitability** – Since it's a Precast R.C.C method it can be done and executed in all districts of Tamil Nadu.
- **Strength** – M15 Concrete
- **Cost** – With proper demand and management, 15 – 20 % saving compared to conventional floor slabs

Table 6 - Tentative cost comparison between the technologies

S.no.	Material	Technology	Cost saving compared to conventional construction
Walls			
1.	Burnt clay brick	Flemish / English bond	Conventional practice
2.	Fly ash brick	Flemish / English bond	10 %
3.	Burnt clay brick	Rat trap bond	15%
4.	Fly ash brick	Rat trap bond	20%
5.	CSEB	Interlock	10%
6.	Fly ash blocks	Interlock	25%
7.	Precast Concrete panels	Precast	10%
8.	Precast Concrete Stone Masonry Blocks	Stretcher bond	10%
9.	Hourdi load bearing	Stretcher bond	25%
Floor slab			
1.	R.C.C slab	Conventional	
2.	R.C.C slab	Filler slab	20%
3.	Hourdi blocks & Precast Joist	Precast slab	8%
4.	Precast R.C.C	RC Plank & Joist	20%

Table 7- Tentative Comparative analysis on proposed materials

	Burnt clay bricks	**Fly ash bricks**	**Interlock CSEB**	**Hourdi blocks**	**Precast conc. panels**	**Precast Concrete Stone Masonry Blocks**
Compressive Strength	7.5 N/mm2	7.5 N/mm2	4 N/mm2 to 10 N/mm2	7 N/mm2	20 N/mm2	7.5 – 10 N/mm2
IS Code	IS 2212: 1991	IS 12894:2002	IS 1725: 1982	IS 3952: 1988	IS 456: 2000	IS 12440-1985
Fast construction	No	No	Yes	Yes	Yes	No
Cost	12.rs per brick	8.rs per brick	45 - 60.rs per block	100.rs per block	150. rs/sqft wall area	-
Thermal insulation	Rat trap bond - yes	Rat trap bond - yes	Yes	Yes	Yes, with interior insulation wall	-
Availability	All districts	All districts	Can be made on-site with local mud	Districts near North Kerala & Bengaluru	All districts	Can be made on-site with stone & concrete debris
Suitability	Suitable for all the districts, material options change concerning particular site contexts.					

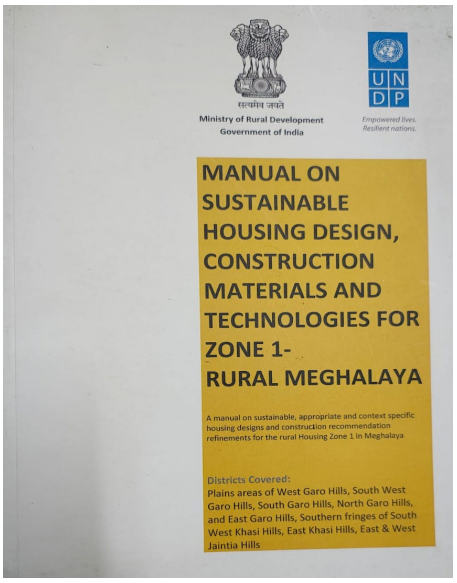
Source: Bureau of Indian Standards (BIS)

Based on our field observations and preliminary assessments, we have identified several technologies that align with Tamil Nadu's climatic conditions. However, it is important to note that these findings are based on indicative studies and observations. To decide on the best or most suitable for each region or zone in the state, a more comprehensive and robust study is necessary.

Validation of all the technologies proposed in the project

It is to be stressed that all the technology options that have been proposed as part of the CRISP project have been developed more than two decades ago and have been used successfully in different parts of the country, including government projects. Standard IS codes prepared by the Bureau of Indian Standards, accepted for all building projects, are available for the proposed technologies.

An MoU was signed between HUDCO, MoRD and UNDP for a detailed study on the greening of rural housing. The study was undertaken in five states where national and regional experts were engaged to carry out a detailed study which included climatic zoning within the states and development of proto type designs suggesting innovative and suitable traditional and environment friendly technologies as well as designs accommodating the cultural, functional and livelihood needs of the beneficiary rural communities. Each prototype design of approximately 25 – 30 sq.m. for each zone was developed with detailed explanations for the technologies, and estimates. This detailed exercise was carried out for all the five states and released to all the state governments for subsequent transmission and use. This has led to the successful adoption of improved technologies and designs in several states. Carrying this exercise forward the Ministry of Rural Development along with UNDP carried out an independent validation of several technologies, an extract from the resulting proceedings is reproduced below. The Ministry of Rural Development Government of India also published 'PAHAL' which is a book of prototype designs for PMAY-G houses.



Validation by CBRI, Roorkee of Technologies for PMAY-G

Reproduced below is an extract from the Consultation proceedings **on exploring collaborations under Pradhan Mantri Awaas Yojana Gramin (PMAY-G) organised by Rural Housing Division MoRD on 16th Jan 2018.**

Presentation by Er. H. K. Jain, CBRI A brief presentation on the process of structural validation of construction technologies was given by Er. H. K. Jain. The presentation was about the validation process adopted by the Central Building Research Institute (CBRI) for the house designs developed by UNDP.

Foundation Technologies	Walling Technologies	Roofing Technologies
Brick/ stone stub	Stone Masonry Blocks	RC Plank and RC Joist roof
Brick/stone arch	Solid Concrete Blocks	Stone Patti on RC/RS joist
	C-bricks	Brick Panel and RC Joist
	Rat-trap Bond	Filler slab
	CSEB blocks	Precast Channel roof
	Modified Cob, Adobe, Wattle and Daub	Ferro cement Channels
	Plastered bamboo ikra panels	Clay tile/MCR Roofing tiles
		Bamboo truss and purlin
		Bamboo reinforced concrete

In summary, we have identified key strategies to improve housing for the poor schemes and highlighted the importance of alternative technologies suitable for Tamil Nadu. This emphasizes the need for sustainable practices in housing construction.

Building on the foundation laid by this approach, the next chapter will delve into the action plan for the Housing for Poor Scheme. This action plan will outline specific measures and steps to implement the proposed strategies effectively.

F. Action plan for Improving Housing For the Poor by CRISP in Tamil Nadu

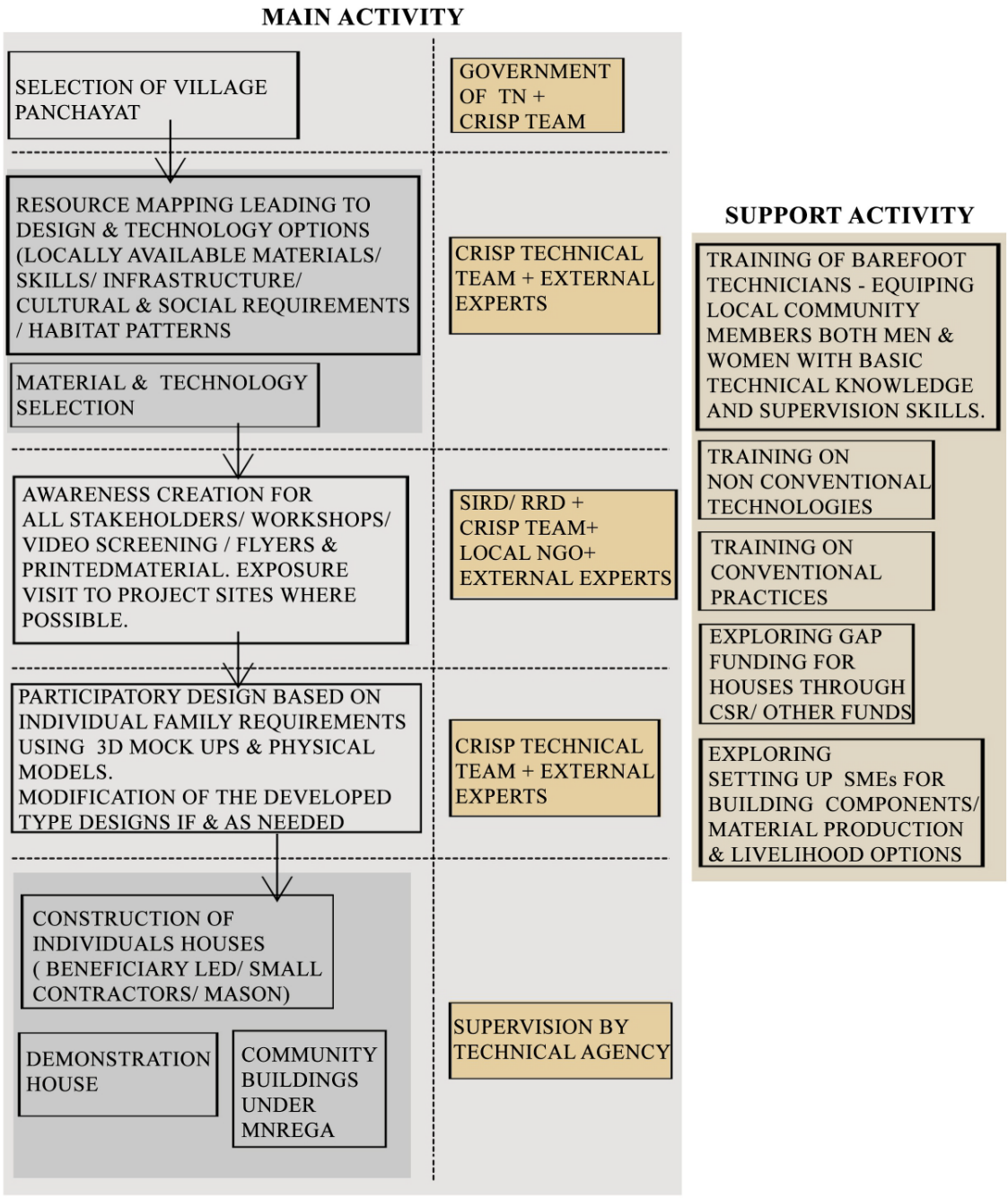
After building an understanding of challenges in housing schemes through our preliminary study, we are proposing an action plan to improve housing for poor schemes in Tamil Nadu

This section is divided into two parts:

1. **An Action Plan for the Promotion of Alternative Technologies**, which discusses our plan and steps to be taken in piloting of the appropriate construction practices in the proposed locations: Thiruvallur and Thiruvarur and then steps that can be taken in scaling up the same.
2. **Suggested Steps for Improvement of Conventional Construction Methodologies**, which focuses on enhancing conventional building practices to improve efficiency and sustainability.

Please refer to the flow chart elaborating the proposed action plan in the accompanying figure

STEPS IN ACTION PLAN FOR EACH SELECTED LOCATION



SCALING UP TO BE TAKEN UP AS A SECOND PHASE BASED ON LEARNINGS FROM THE ABOVE OUTLINED PILOT PHASE WITH THE SUPPORT OF GOVERNMENT OF TAMILNADU - RD DEPARTMENT , SIRD & OTHER AGENCIES

1. Action Plan for Promotion of Alternative Technologies.

CRISP proposes an innovative approach to rural housing in Tamil Nadu through a piloting project and then later scaling up of this approach incorporating our learnings from the piloting.

I. **Piloting project at proposed locations:** We are proposing a pilot project to promote the use of appropriate technologies in housing construction under various schemes in Thiruvallur and Thiruvarur districts. The pilot sites have been provisionally selected, the finalization of these locations will be carried out in a consultative process with the Department of Rural Development, Should the department recommend specific districts, we will incorporate those suggestions into the project. CRISP proposes to intervene through three strategies to promote alternative technologies in housing for the poor schemes in the proposed locations:

- **Beneficiary Led Construction:** Under this strategy, we aim to encourage beneficiaries of housing schemes such as KKI and PMAY-G to adopt alternative construction technologies for building their homes. We require the Tamil Nadu government's support to:
  - ❖ Facilitate communication with beneficiaries in the selected panchayats.
  - ❖ Assist in creating awareness and convincing beneficiaries to choose these alternative technologies.
  - ❖ Provide necessary permissions, as per scheme provisions, in the later steps for the adoption of these new methods

  The detailed steps CRISP will be taking in this pilot are provided later in the section.

- **Demonstration Houses *(Refer annexure)*:** As per the PMAY-G guidelines, demonstration houses with the house designs based on space planning, technologies and specifications appropriate to the local context may be constructed preferably at the block level and made available for the beneficiaries to visit. CRISP will be partnering with technical agencies experienced in appropriate construction practices, who can take up the construction of two demonstration houses in each proposed location. To implement this, the government support is required to:
  - ❖ Approve the allocation of PMAY-G funds for the construction of demonstration houses in each proposed location.

- ❖ Assist in selecting suitable sites at the block level for these demo houses.
- ❖ Provide ongoing support for the construction process in partnership with technical agencies, ensuring these houses serve as effective models for local communities.

- **Community Buildings through MGNREGA *(Refer annexure)*:** It has been suggested that community buildings under MGNREGA can be taken up using alternative technologies, such as panchayat offices, Anganwadi centres and Community sanitary complexes as permitted in the guidelines. To execute this, the government's support is essential to:
  - ❖ Approve and facilitate the use of alternative technologies within the MGNREGA framework.
  - ❖ Help identify suitable public building projects in the proposed districts where these methods can be applied.
  - ❖ Partner with district administrations to monitor and ensure the successful implementation of these construction technologies, which will enhance visibility and confidence in these methods.

Now for the piloting, the following steps will be taken by CRISP with the support of TN government.

i. **Stakeholder Awareness**: For creating awareness among stakeholders with regards to appropriate technologies these steps will be taken.

- **Identification of CBO** - With support from the government, CRISP will identify a suitable NGO, international NGO, or CBO with a strong presence in the target region. they will be co-opted, trained, and sensitized on the selected alternative technologies to facilitate their role in encouraging beneficiaries to adopt these technologies. The training will be conducted with support from SIRD and RIRD. They can aid CRISP in raising awareness among beneficiaries about alternative technologies.
- **Workshops and exposure visits**: CRISP, in collaboration with SIRD, will conduct workshops for beneficiaries and panchayat members on appropriate construction methodologies. These workshops will feature success stories and use audio-visual materials curated by CRISP to raise awareness about the benefits and effectiveness of these technologies. With the support of the Rural Development Department, beneficiaries and ground staff in the proposed locations can

participate in exposure visits organized by respective panchayats and supported by CRISP. This hands-on experience will provide beneficiaries with valuable insights into the benefits and possibilities of using appropriate technologies for housing.

ii. **Implementation of appropriate technologies:** CRISP will identify and implement suitable technologies for housing construction in selected locations, ensuring alignment with local conditions and community needs by partnering with an identified technical agency for the construction. Both processes are explained in detail below.

- **Suitable technologies:** In the detailed discussion in the preceding section, a set of alternative technologies suitable for the state of Tamil Nadu has been presented. Site visits were made to Thiruvallur and Thiruvarur and based on a rapid assessment of available materials and skills, a selection of walling and roofing options from those shortlisted in the earlier section on technologies, for each of the proposed demonstration districts is suggested as below.

Construction Technologies proposed for Thiruvallur District.

1. Walls – Exposed masonry (beneficiary can plaster/ paint if required)
   a) Rat trap bond with Fly ash bricks / Combination of 4” wall with brick pillars
   b) CSEB/ Fly ash interlock blocks
   c) Hourdi blocks - Load bearing
2. Roof slab
   a) RCC Filler slab
   b) Precast Joist with Hourdi blocks

Justification for the proposed technologies

Manufacturing units of Hourdi blocks are located near Thiruvallur District. Since Hourdi blocks are hollow (with air cavities), they provide effective thermal insulation, making them ideal for high-temperature areas like Thiruvallur. Thiruvallur District has an abundant supply of fly ash, largely sourced from Thermal Power plants of Ennore (ETPS) and North Chennai (NCTPS). A CSEB interlock model house exists in the locality, serving as a demonstration project for beneficiaries to visit and replicate.

Construction Technologies proposed for Thiruvarur Distri

1. Walls - Exposed masonry (beneficiary can plaster/ paint if required)
    a) Precast Concrete panels
    b) Precast Concrete Stone Masonry Blocks
    c) Rat trap bond with Fly ash bricks / Combination of 4" wall with brick pillars
2. Roof slab
    a) RCC Filler slab
    b) Precast RC Plank & Joist

Justification for the proposed technologies

Thiruvarur district, located in the Cauvery Delta region, is indeed heavily reliant on agriculture, with around 90% of its population engaged in farming and allied activities. However, the presence of brick kilns can pose a significant threat to soil quality, vegetation, and agricultural productivity, ultimately leading to landscape degradation. Fortunately, the beneficiaries in the region have shown acceptance of EPS technology, which utilizes panels similar to precast construction, eliminating the need for burnt clay bricks. This sustainable approach can help mitigate the adverse effects of traditional brick kilns on the environment. It must be noted that EPS technology employs thermocol (Expanded Polystyrene), which raises environmental concerns due to its non-biodegradability. In the option proposed for the pilot, a composite system using a combination of pre cast concrete walling panels and blocks is proposed which can be locally manufactured by vendors of concrete products.

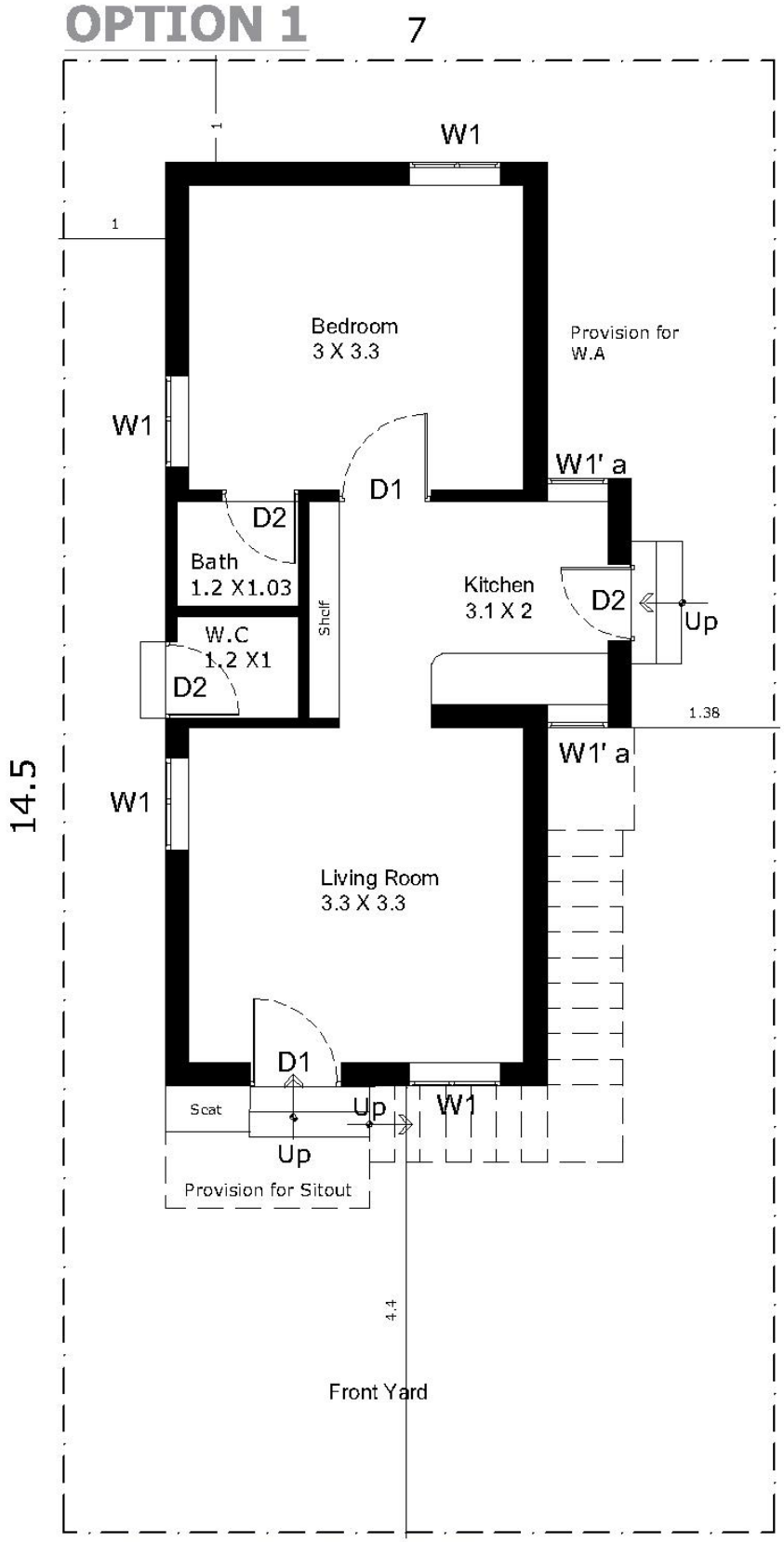
From the observations of the site visit, it is also noticed in-situ concrete quality often results in sagging and poor performance. A Partially precast system can ensure good roof quality through controlled manufacturing.

- **Technical agency:** CRISP will collaborate with external technical agencies, who can lead the construction of the beneficiaries' houses in the technologies proposed. These agencies will explore construction methodologies (self-built, mason-driven, or contract-based) and select the most viable options, providing hands-on support to beneficiaries. Additionally, they will handle bulk procurement, source specialised suppliers, and ensure the deployment of skilled workers for quality assurance.

iii. **Development of Type designs:** Prototype design options for KKI houses have been developed and details are given below which can be used in our pilot phase. Designs have been developed based on some common parameters and according to observations made during field study and can be modified in a participatory manner with the household. We will be creating 3-D models both in physical and online model to help beneficiaries helping, them make an informed choice

1. Assuming a plot size of 2.5 to 3 cents & designing to the plinth area as per KKI guidelines of 390 sqft including kitchen & toilet.
2. Total of 8 options were designed for different plot configurations.
3. For a typical rectangular plot 10m X 10.1m, 3 options have been developed and have been numbered as 1A, 1B, 1C
4. Options 2, 3 & 4 had been prepared with different design options & different proportions of rectangular plots.
5. Option 5A & 5B are two variations of plan on the same plot size.
6. In every case provisions for future expansion, staircase & livelihood activities have been indicated.
7. These are representative type design & minor modifications within the same parameters will be carried out based on the specific requirement of beneficiary family. For example, separate toilet & bath can be provided if required.

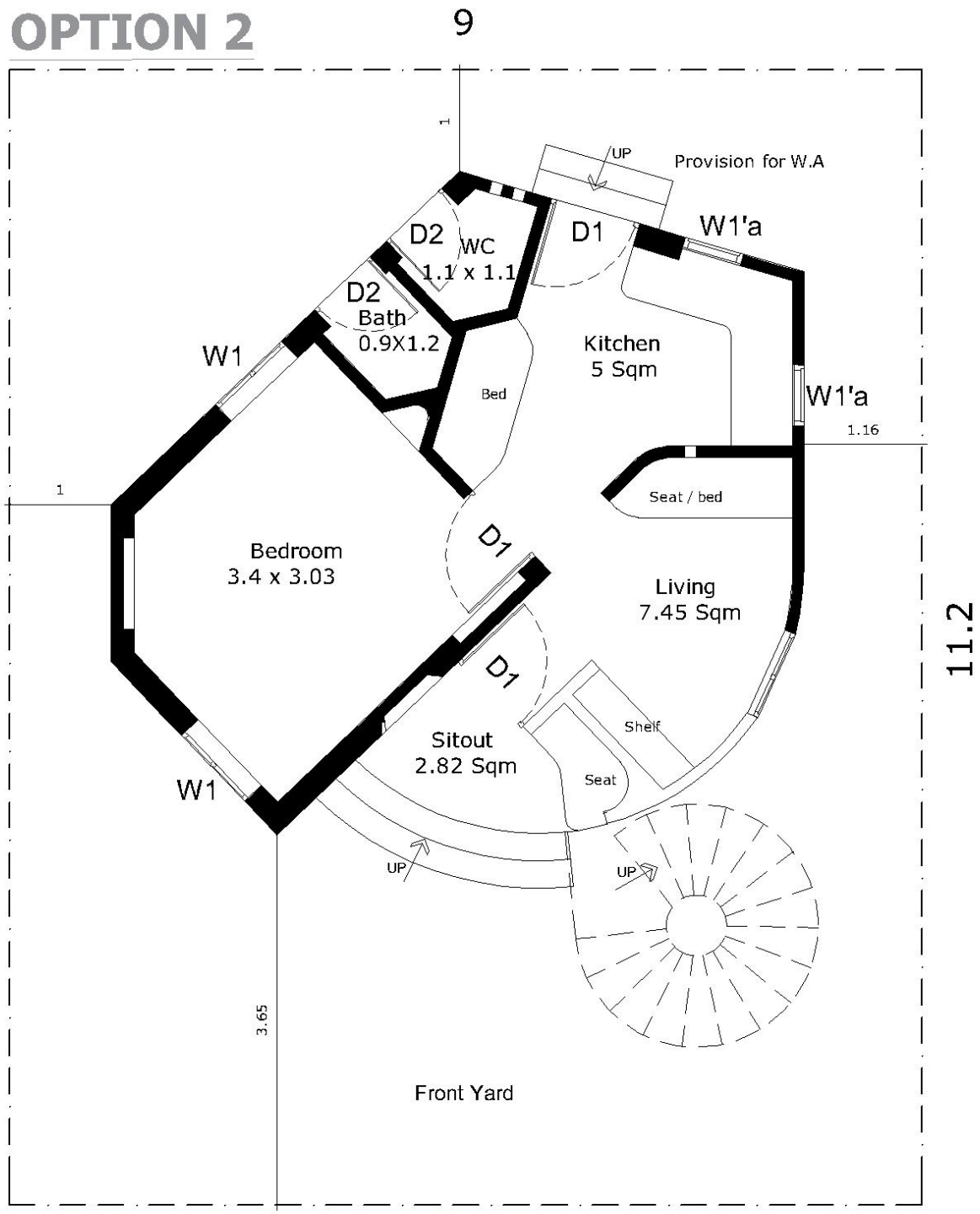
The representative type designs developed by CRISP can be seen below



GROUND FLOOR PLAN

Plot area - 2.5 Cents
Area - 36.22 sqm or 390 sqft

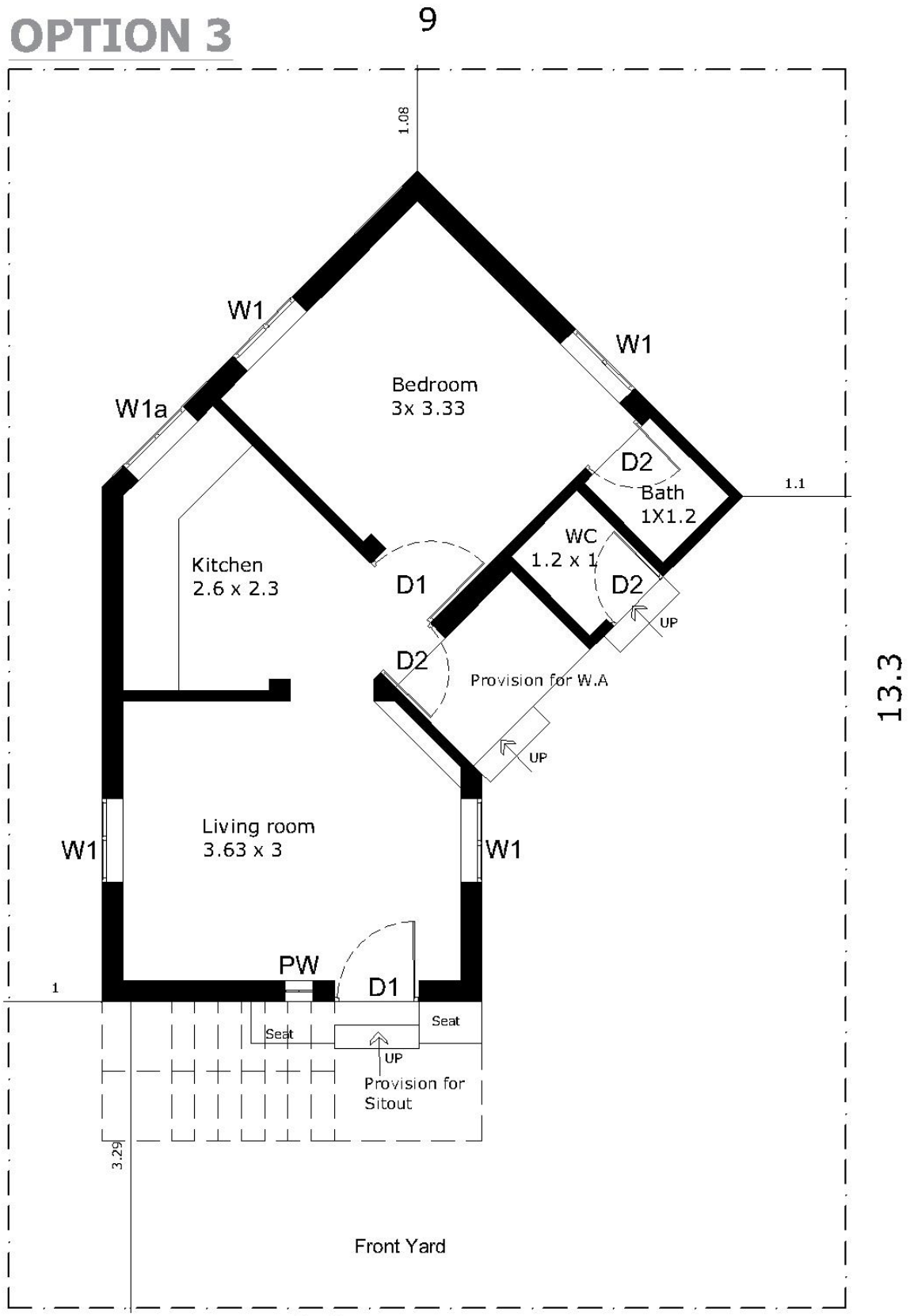
All dimensions are in meters



GROUND FLOOR PLAN

Plot area - 2.5 Cents
Area - 34 sqm or 366 sqft
All dimensions are in meters

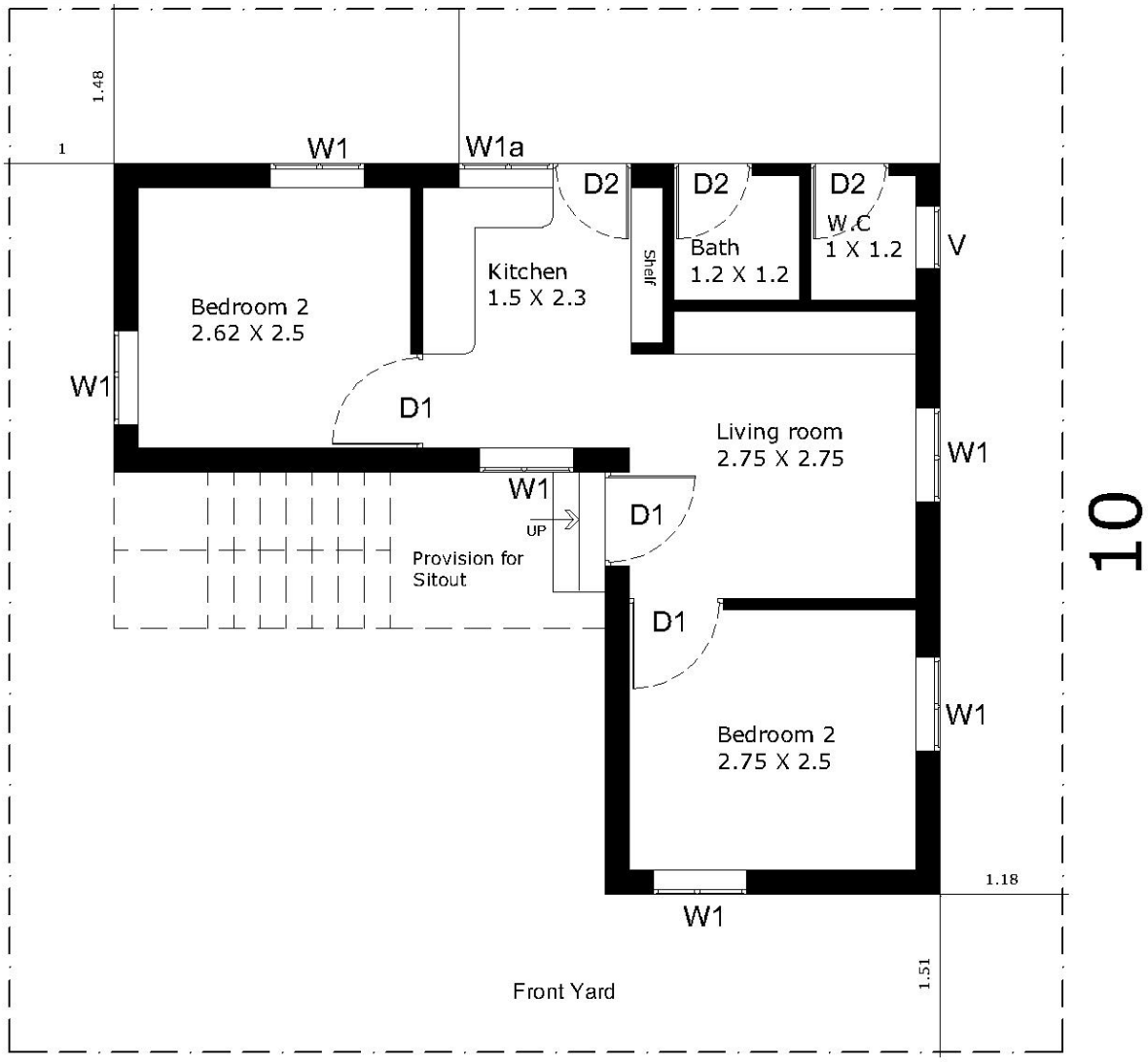
OPTION 3



GROUND FLOOR PLAN

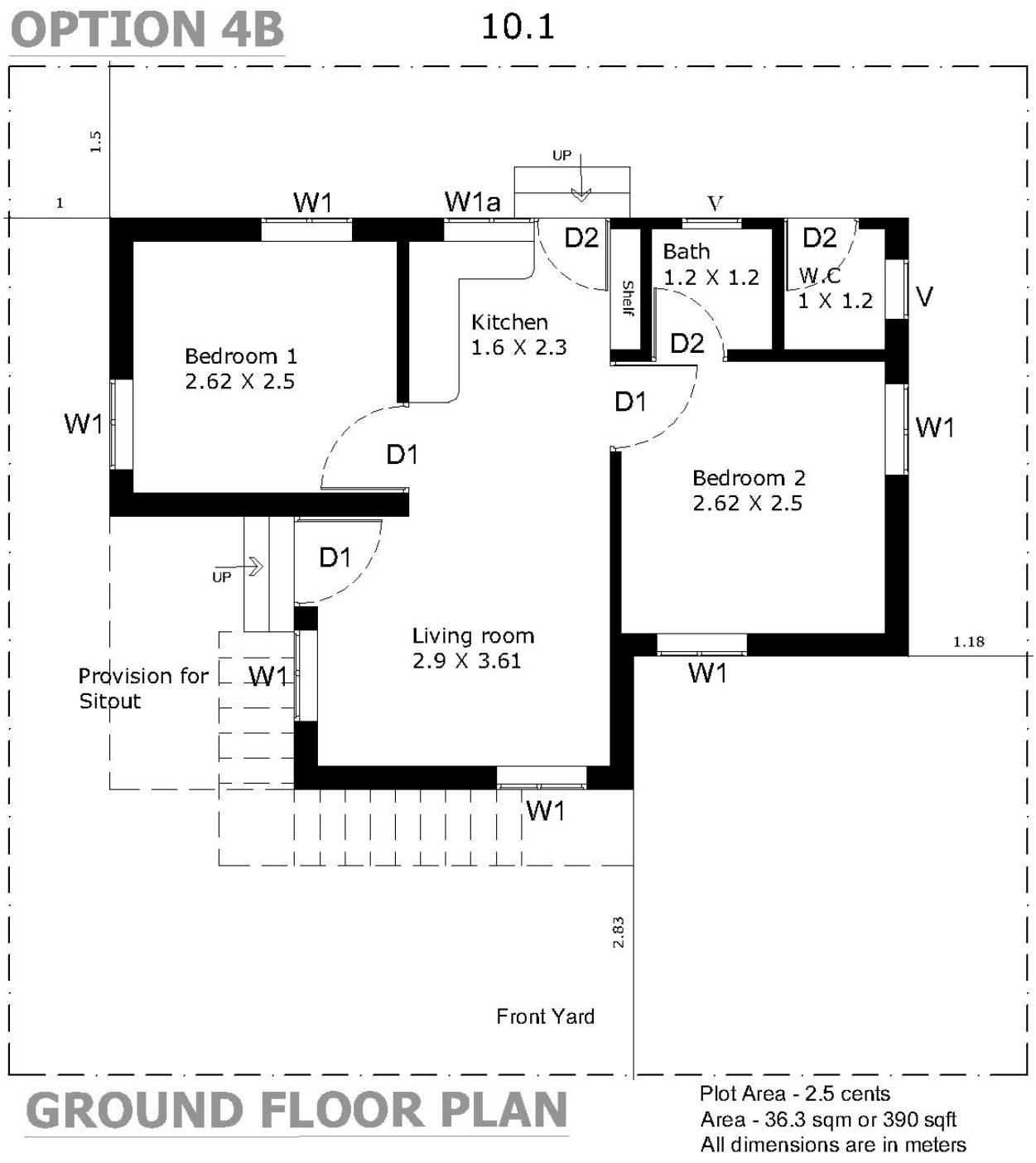
Plot area - 3 Cents
Area - 36.26 sqm or 390 sqft
All dimensions are in meters

OPTION 4A 10.1



GROUND FLOOR PLAN

Plot Area - 2.5 cents
Area - 36.3 sqm or 390 sqft
All dimensions are in meters



All floor plans designed & drafted by Ar. Dhanaseelan

iv. **Livelihood linkages:** CRISP will facilitate training along with SIRD for SHGs to engage Self-Help Group (SHG) members in the construction process. We will require support from SIRD and RIRD for conducting this training. The training aims to develop "barefoot

architects" within the community, equipping SHG members with the skills to participate in the construction of their own homes. This approach will provide cost-effective solutions for beneficiaries and also serve as an income-generating opportunity for community members.

II. **Scaling up of the piloting:** Following the successful piloting of appropriate technologies in housing schemes for the poor, the Tamil Nadu government can scale up the initiative across the state. CRISP will provide support in this process by:

- **Learning consolidation and next steps:** After the piloting of the project, the learnings from the piloting can be consolidated into a report by CRISP, The RD department can utilise it for scaling up the use of appropriate technologies in housing for the poor scheme across Tamil Nadu.
- **Capacity building modules:** CRISP will develop capacity-building modules for ground staff focused on appropriate construction practices. These modules will be used to conduct training workshops for masons, overseers, and other relevant personnel, ensuring they acquire the necessary skills and knowledge to implement sustainable construction practices in their communities**.**
- **Database for practitioners:** CRISP will assist the Tamil Nadu government in creating a database of practitioners specializing in sustainable construction practices. This directory will enable beneficiaries to easily find qualified professionals for their construction needs.
- **Audio Visual Content:** CRISP will support in gathering the audio visual content related to success stories in construction of homes using appropriate tech which can be used to convince beneficiaries during sclae up. RD can also take them for exposure visits to different locations.

2. Improvement of Conventional Construction Methodologies

It must be emphasized that cost effectiveness in construction can be achieved even in conventional construction. The informal nature of the construction sector in India and the lack of standardised training and apprenticeship format has meant that there is a huge variation in construction quality across the country. This is particularly true in remote and rural areas where there has been little or no penetration of improved construction technologies. It must be said that the introduction of the National Skills Qualification Framework (NSQF) and the role of the CSDCI has been commendable in standardising the skill level of different construction trade. However in the context of schemes such as the KKI, improvement of conventional

construction technology, better site management and simple attention to detail during the process of construction can contribute significantly to cost reduction.

1) **Standardisation of construction practices**: CRISP will work with SIRD and RIRD to conduct training on construction practices. CRSP can bring in experts like Dr. Ravidra Gettu who can guide us in standardising the construction practices in conventional practices which can help a standardised practise to be followed all over in Tamil Nadu. The training can be provided to masons, overseers etc, so that it can be translated into ground
2) **Quality checklist for beneficiaries:** CRISP can support SIRD in organising training for Community Resource Persons (CRPs) from respective Gram Panchayats who can be trained in a checklist that help them to check the quality of construction. CRISP can support in creation of this check list. This CRPs can then transfer this knowledge to the respective beneficiaries enabling them to keep a check and balance process in construction of their homes.

The Action Plan for improving housing for the poor by CRISP in Tamil Nadu represents a comprehensive strategy to enhance both alternative and conventional construction methodologies. By focusing on innovative approaches, such as pilot projects with alternative technologies and community-led construction models, CRISP aims to demonstrate the benefits of sustainable and efficient housing solutions. The plan includes detailed execution strategies, stakeholder engagement, and capacity-building measures to facilitate the successful adoption and replication of these technologies. Simultaneously, improvements in conventional methods are emphasized to ensure a holistic advancement in construction practices. Together, these efforts will significantly contribute to improving housing conditions for the rural poor, ensuring both innovation and refinement in construction practices.

Annexures

Questionnaire

A. This questionnaire is to be completed by beneficiaries based on the current stage of their house, which is:

a. Completed ☐ Under construction☐ Potential Beneficiaries☐

B. Basic details

a. Name

b. Occupation

C. Type of scheme

a. State ☐ Centre☐

D. Basic Questions about the House Constructed

1. What is the status of your house? (Select one)

   a. Completed ☐ Under construction☐ Unable to complete☐

2. If complete, how much time was taken to complete the construction?

B. Basic Questions about the House Structure Constructed

1. Who made the plan for the house?
2. Were you shown multiple design options?
3. What is your means of livelihood? Are there any related space requirements?
4. Have beneficiaries added to the government-constructed houses using their funds?

D. Land Ownership and Location Accessibility

1. Who has the title to the land?
2. What is the size of the land you own?

3. If the Government provided it, how long did the process take to acquire the land ownership?

E. Accessibility and Governance of the Scheme

1. How long did it take for your application to be approved?
2. Did you receive any support during the application process?

F. Financing

1. How much money did you receive under the scheme?
2. Were there any top-ups from the state government?
3. Was the financial assistance sufficient to cover the construction/acquisition costs?
4. Have you paid extra for any further extensions? If yes, how much?
5. Was the payment released in phases and were there any delays?
6. What issues have you faced regarding financing - the release of the funds, repayment to lenders, challenges in obtaining loans, etc.?

G. Construction Process

1. For the construction of this house, did you outsource the construction to contractors? (To be written/typed)
2. What was the process of procuring materials?
3. Were you able to procure any subsidised materials for the construction?
4. Were there any challenges in getting laborers for the construction?
5. How many days of wage labor under MGNREGA did you receive to construct your own house?
6. Have you noticed many people are building farmhouses/houses with exposed brickwork, mud, lime, reused wood/reused doors, and windows? Would you like more information about these materials?

7. *We can show the beneficiaries the below photos, and have a conversation with them and note their response to these technologies*

Rat Trap bond walling

MCR Tile roofing

Interlocking block

Filler slab Roofing

Compressed Stabilised Mud

I. Satisfaction with the Existing Building Structure

1. Does the housing unit meet your family's needs in terms of size and layout? (To be written/typed)
2. Is there enough area around in case you decide to expand your house (considering the allocated sq. ft and the capacity of it to accommodate a family)? (To be written/typed)

OBSERVATION NOTE FOR DATA COLLECTION

1. *Make a line sketch of the building.*
2. *Check for overhanging projections and sunshades.*
3. *Observe the structure for leaks or any such damages.*
4. *Observe the land provided and their accessibility to services.*
5. *Latitude longitude coordinates/google location of the house*
6. *Observe how many rooms there are in the house and if there are designated spaces for Kitchen, living room, washroom, etc.*
7. *Observe how the sewage and waste management is done.*
8. *Observe if the beneficiaries occupy the house or use it for any other purpose.*
9. *If any new technology is used, observe whether it's appropriate for the climatic conditions.*
10. *General comments on the Housing scheme (Ask as a free flowing question)*

2020

GUIDELINES FOR CONSTRUCTION OF DEMO HOUSES UNDER PMAY-G

RURAL HOUSING DIVISION

MINISTRY OF RURAL DEVELOPMENT, GOI

Abbreviations–

1. **PMAY-G** - Pradhan Mantri Awaas Yojana – Gramin
2. **FFI-PMAYG** - Framework for Implementation-PMAY-G
3. **IIT** - Indian Institute of Technology
4. **UNDP** - United Nations Development Programme
5. **CSIR-CBRI** - Council of Scientific and Industrial Research - Central Building Research Institute
6. **BDO** - Block Development Officer
7. **PIA** - Project Implementing Agency
8. **ILO** - International Labour Organization
9. **IISc** – Indian Institute of Science
10. **TP** - Training Provider
11. **BOQ** - Bill of Quantities
12. **DPR** – Detailed Project Report
13. **JE** - Junior Engineer
14. **TA** -Technical Assistant
15. **T&P** - Tools and Plants
16. **QP** - Qualification Pack
17. **IT** - Information Technology

1. Background–

Pradhan Mantri Awaas Yojana – Gramin (PMAY-G) aims at providing the pucca houses, with basic amenities, to all rural houseless households and those households living in kutcha and dilapidated houses, by 2022.

While achieving this huge target, to promote the use of region-specific appropriate construction technologies in the construction of PMAY-G houses, Framework for Implementation-PMAY-G (FFI-PMAYG) emphasizes that the beneficiary should be assisted with options of house designs according to local conditions, using appropriate technologies suitable to the region of their residence.

The use of region-specific design typologies and specifications in the construction of PMAY-G houses will make them socio-culturally acceptable, reduce the cost of the building, increase the disaster resilience, and generate livelihood in the local communities. Over and above with the use of low embodied energy building materials, the possible adverse environmental impact associated with high housing targets can be reduced.

2. Demo houses under PMAY-G –

As an effort in the promotion of locally appropriate house designs, MoRD with the help of the Indian Institute of Technology, Delhi (IIT), and the United Nations Development Programme (UNDP) undertook region-specific studies in the selected states and developed house design typologies for clearly identifiable housing zones. The range of the materials and technologies proposed through these typologies have been architecturally and structurally validated by CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee. As an outcome of the study, MoRD has published a compendium of Rural Housing Typologies with the name 'Pahal (Volume-II)'. In the remaining States/ UTs house design typologies for different housing zones being developed/ have been developed by the State/ UTs themselves.

As further facilitation, for a proper understanding of house design typologies to the beneficiaries, demonstration houses built using such typologies must be available to be visited by them.This would provide an opportunity for the beneficiaries to

experience the spaces, volume, circulation, privacy, light, ventilation, type of finishing, doors, windows, etc. in the suggested house designs. In addition, they will get a clear idea of the cost and incremental development of the house.

Therefore, demonstration houses with the house designs based on space planning, technologies and specifications appropriate to the local context may be constructed preferably at the block level and made them available for the beneficiaries to visit.

3. Designs-

Demo houses at block level may be constructed with the following housing designs–

3.1. House designs in a compendium - 'Pahal (Volume-II)', which includes 108 house design typologies for 15 States viz. Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Rajasthan, Sikkim, Tripura, Uttar Pradesh, and West Bengal.

3.2. House design typologies developed by the States/ UTs for its different housing zones considering local geo-climatic conditions, availability of local materials and technologies, vulnerability to disaster/hazards, livelihood aspects linked to housing designs and existing community skills and as validated by any of the reputed national technical institutes enclosed at **Annexure-I.**

3.3. House design typologies developed by the national technical institutes such as CSIR-CBRI, IITs, NITs, IISc, etc. with alternative construction technologies and are viable/ appropriate in the regional context.

4. Location–

4.1. Demo houses are preferably to be constructed at the Block level and proposed to be visited by the beneficiaries in the Gram Panchayats in that Block. Considering **visibility and accessibility by the beneficiaries**, demo houses shall be constructedif possible,in the office premise of Block Development Officer (BDO). They may also be constructed on the Government or public land near market places, public places, areas of the community congregation, bus stand, etc. provided that the buildings after their completion shall serve an additional official purpose

for the block administration such as office space, canteen, information kiosk for the PMAY-G beneficiaries to act as a rural housing facilitation center, etc.

4.2. Since the prime objective of constructing the demo houses is that they are to be visited by the PMAY-G beneficiaries, no such activity shall be proposed in the buildings which would restrict entry to the beneficiary or not allow them to experience the indoor spaces. Demo houses shall be available to be visited by the beneficiary in the day time during official working hours.

4.3. The appropriate site for the construction of demo-houses may be identified in the consultation with technical personnel from the Project Implementing Agency (PIA) / State Government. Some of the technical and functional considerations while selecting the site are listed below -

i. The site for all the demo houses shall be on the same premise.
ii. The site shall be located on elevated terrain and not in low lying areas.
iii. The site with reclaimed [1] or expansive [2] soil should be avoided as far as possible.
iv. The groundwater level at the site should be adequately low.
v. The site should have proper vehicular and pedestrian access.
vi. The selected site should be large enough; to ensure the building abundant light and ventilation to prevent any over dominance by the neighbouring buildings.
vii. Civic services such as water supply, drainage sewers, electric lines, telephone lines, etc. should be near to the selected site to obtain their services at no extra cost.

5. Number of houses to be constructed –

The number of demo houses at the block level shall be based on the number of developed and validated house design typologies, appropriate to the geographical region covered under the block administration.

6. Project Implementing Agency (PIA) –

6.1. State/ UT shall appoint PIA for the execution of the Demo houses. For the same purpose, the proposals may be invited from the organisations/ institutes having expertise in the required construction technologies for the construction of demo houses. There can be more than one PIA for construction of different Demo-Houses considering their expertise in specific construction technology. The organisations/ institutes which can be onboarded as PIAs are:

i. National and State level Government agency/ department.
ii. International Organizations.
iii. Technical institutes within the states like CSIR-CBRI, IITs, IISc, etc.
iv. Public Sector Undertaking (PSU) or a Public Sector Enterprise (PSE) in the field of building construction.
v. The organisation involved in the development of region-specific house design typologies for the State/ UT.
vi. The organisations having expertise in construction with appropriate technologies and as decided by the state.
vii. Training Provider (TP) engaged for rural mason training under PMAY-G.

For the design typologies developed/ validated by IIT and CSIR-CBRI, they can also be appointed as PIAs directly for their own designs. The PIAs could also be a combination of above with a strong local agency that is willing to work with the guidance provided by the technical support from the above-mentioned agencies. But this will be adopted as a last recourse.

6.2. The role of PIA are as under -

i. Appointing a full-time site supervisor
ii. Working out Bill of Quantities (BOQ)/ cost estimate for the design typologies for demo houses with the help of the Junior Engineer (JE) / Technical Assistant (TA) on the project.
iii. Deployment of the masons/ artisans for the construction of demo house
iv. Procurement of the materials, labour, tools, and plants (T&P) with the help of JE/TA.
v. Construction of Demo house including all the finishes as per specifications
vi. Preparation of project report and submission at BDO office

vii. Completion of the demo house in a time-bound manner.

viii. Additionally, PIAs can also be engaged for Development of Analysis of Rates / Detailed Project Report (DPR)/ Cost comparison. Getting the same validated from National Technical Institutes with the help of state government to facilitate its inclusion in the Schedule of Rates (SoR).

7. The nomination of technical officers -

State Government may nominate one JE / TA at the block level to extend technical support like working out BOQ for the design typologies for demo houses and logistic support like procurement of the materials, labour, T&P, etc. for smooth implementation of the project.

8. Rural mason training on Demo house–

Demo houses on which training can be imparted to the candidates in compliance with National Skill Development Corporation (NSDC) approved Qualification Pack (QP) for rural mason / QPs on alternative construction technologies, the rural mason training may be clubbed with the construction of demo houses. The processes for training the rural masons on demo houses will remain the same as given in the guidelines for Rural Mason training. In such a case, the training provider will take care of the responsibilities of PIA but funding to the TP will remain as per Rural Mason Training Guidelines issued by the Ministry along with subsequent amendments.

9. Funding–

9.1. A component from the admin fund released to the State/ UT shall be used for the construction of demo houses. Funding pattern to the PIA for the construction of one demo-house is detailed below -

S N	Item	Cost (INR)	Source of funding
1	**Professional fees to PIA** (Includes- salary of the site supervisor (including	**Up to INR 80,000/-** (Rationale- nearly equal to per house pay out under RMT	State admin fund/ Under special project by MoRD/

S N	Item	Cost (INR)	Source of funding
	TA and DA), expert visits by the PIA at least at 3 different levels of construction, Report documentation, etc.)	= INR 46.7 (Common norms' rate) *5 (Masons)*8 (hours)*45(days) = INR 84,060)	Any other authorised source of funding
2	**Construction Cost**	**Up to INR 1,40,000/-** (for plain areas)**/ Up to INR 1,50,000/-** (for hilly, difficult areas and IAP districts, as per cost estimation). It can exceed in accordance with the additional financial support being provided by the State/ UT to the beneficiaries over and above the assistance under PMAY-G	State admin fund/ Under special project by MoRD/ Any other authorised source of funding
3	**Miscellaneous** (Contingency, IEC information board, a lamp-post near house entrance, roof-top rainwater harvesting, etc.)	As per the cost estimation pre-approved by the appropriate authority (Shall not exceed INR 50,000/-)	State admin fund/ Under special project by MoRD/ Any other authorised source of funding

9.2. Funding to the PIA may be released by the State Government as per the following installments –

S N	Item	Installments
1	At the time of signing an agreement with PIA	30% of the professional fees

S N	Item	Installments
2	Submission of the Cost estimate prepared by the PIA with the help of TA and JE	100% of the total cost of construction (including miscellaneous) as per approved estimate.
3	Completion of the Demo- house, Submission of documentation report, After issuance of Completion Certificate by an engineer not below the rank of Executive Engineer/ equivalent.	Remaining 70% of the professional fees

Additional funding for the construction of the demo houses would be available under special projects.

10. Quality and monitoring –

Completion of the demo houses will be monitored at the different levels of administration with an IT-based module in the AwaasSoft being developed by the Ministry. The construction quality of the demo houses shall also be reviewed by the senior engineering staff at the State/ District level.

11. Popularising the demo houses –

Block/ GP level administration shall plan for different IEC activities at the Gram Panchayat and Block level for awareness of beneficiaries towards the purpose of Demo houses. The following is an indicative set of activities that can be done towards popularising demo houses, and to ensure maximum footfall:

- Official/ Socio-cultural activities may be proposed around the demo houses to attract beneficiaries to visit the buildings.
- Exposure visit to demo houses may be organised by the Gram Panchayat Office.
- Other IEC activities like an advertisement, promotion vans, wall painting, hoardings, banners, promotion in village haats and rural markets, may be explored.

- Video and other documentation will be prepared and displayed and shared on important occasions.
- Media visits to be conducted around the demonstration houses.

12. Documentation–

Project report on the completion of the house consisting of architectural drawings, structural drawing, construction details, cost estimate, item wise actual cost of construction, illustrations, photographs at different levels of construction, description whenever required, etc. Shall be prepared by the PIA. The report may be submitted to the BDO for uploading on the Awassoft. Report on demo house construction in the local language may be availed by the block office to the beneficiary on demand.

13. Schedule of activities and responsibilities-

The suggestive schedule of activities and responsibility matrix has been enclosed at **Annexure-II.**

***

[1] Landfill soil
[2] Soil that is prone to large volume changes (swelling and shrinking) due to changes in water content.

Annexure-I

National Technical Institutes for Architectural and Structural validation of the house design typologies developed by the States/ UTs-

1. CSIR - Central Building Research Institute, Roorkee
2. IITs with Architecture/ Civil / Structural engineering department.
3. NITs with Architecture/ Civil / Structural engineering department.
4. IISCs with Architecture/ Civil / Structural engineering department.

Annexure-II

Suggestive schedule of activities and responsibility matrix –

S N	ACTIVITIES	TIME LINE (IN WEEKS)																				
		<1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	19<
1	Development and validation of design typologies for different housing zones in the State/ UT along with the quantity estimations	M/S																				
2	Identifying designs for Demo houses from the validated design typologies		S	S																		
3	Site identification for the construction of Demo houses at the block level				S	S																
4	Deputing one JE / TA from the block office for the project				S	S																
5	Awarding contract to the PIA					S	S	S	S	S												
6	Appointing a full-time site supervisor										P											
7	Workout BOQ for the design typologies for demo houses with the help of the JE /TA										P/S											
8	Procurement of the materials, labour, tools and plants (T&P) with the help of JE /TA											P	P									
9	Construction of Demo house including the finishes as per specifications.												P	P	P	P	P	P	P	P	P	
10	Documentation, report compilation and submission to BDO office																					P

M - Ministry of Rural Development | S – State Government | P- Project Implementing Agency

सुनील कुमार
सचिव
भारत सरकार
पंचायती राज मंत्रालय

SUNIL KUMAR
SECRETARY
Government of India
Ministry of Panchayati Raj
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Tel. No. 23074309; 23389008

सत्यमेव जयते

नागेंद्र नाथ सिन्हा
सचिव
भारत सरकार
ग्रामीण विकास मंत्रालय

NAGENDRA NATH SINHA
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Ministry of Rural Development
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D. O. No. G-39011/2/2017-FD

10th June, 2020

Dear Chief Secretary,

In the last two months, the country has been faced with an unprecedented situation arising out of the COVID-19 pandemic and the consequent lockdown. While the country has gained time during the lockdown to ramp up health facilities, prevent a rapid surge in COVID-19 cases and keep the mortality rate in check, the biggest challenge before Central and State Authorities in rural areas at this juncture is to provide employment opportunities to returning migrant labourers and rural labourers which is commensurate with their skill sets. However, at the same time there can be no let up in community vigil and strict adherence to guidelines issued by the Health Authorities to check spread of COVID-19.

2. A sample of skill mapping data of migrant labourers undertaken by some States in the past few days/weeks reveals that majority of workers have skills relating to construction industry. It is understood that these skilled workers may not be willing to work as unskilled labourer on Mahatma Gandhi NREGS work sites. Further, as per available information, in several States, a large number of isolation /quarantine centres in rural areas have been set up in Primary/Upper Primary School buildings. These will need to be vacated once the schools reopen. As per available information, it appears that the effect of COVID-19 pandemic is likely to continue for some time at least. Hence, the requirement for continued establishment of isolation / quarantine centers in rural areas is likely to persist in the near foreseeable future.

3. With a view to provide employment to persons in rural areas as per their skill sets and also to strengthen community infrastructure to enable Gram Panchayats (GPs) to effectively meet the challenges, it has been decided by Government of India to permit utilization of 14th Finance Commission (FC) grants available with Gram Panchayats as well the ensuing 15th FC untied grants (which they will be receiving shortly) during 2020-21 towards construction of specific community assets like Gram Panchayat Bhawans apart from undertaking repair and maintenance of other Public Buildings/Assets located in the Gram Panchayat by engaging and utilizing the services of the skilled/unskilled workers for the same.

4. According to available information, there are about 60,346 Gram Panchayats which do not have Panchayat Bhawans. A statement showing State wise availability of unspent 14th FC Funds (as per information available in PRIASoft), likely allocation under 15th FC, deficit GP Bhawans is enclosed.

5. The maximum approved unit cost for Gram Panchayat Bhawan by Ministry of Panchayati Raj is Rs. 20 lakh. It has been decided to meet 50% cost of Panchayat Bhawan through Finance Commission Funds and 50% of the cost from Mahatma Gandhi NREGS funds. In case the available unspent balance under 14th FC available with GP is insufficient to meet the 50% cost of Panchayat Bhawan, the deficit may be met by utilizing the 'untied funds' likely to be made available to GPs under 15th FC or State Finance Commission (SFC) Grants or Own Sources of Revenue(OSR).

6. Further, GPs may also undertake repair and maintenance of other Public Buildings/Assets located in the Gram Panchayat such as Primary/Upper Primary Schools, Health Sub Centres, Cooperative Stores selling seed and fertilizers etc., wherever necessary by utilizing the Finance Commission funds.

8. It is reiterated that the aforesaid decision has been taken to meet the key infrastructure deficit in rural areas and to provide immediate employment opportunities to skilled and unskilled manpower currently available in rural areas through convergence of Central Finance Commission and Mahatma Gandhi NREGS funds. **These works need to be initiated immediately and completed within this financial year in a mission mode**. Further, this decision is valid ONLY for the current financial year.

9. We believe that if the State Authorities also decide to permit utilization of funds made available under State Finance Commission recommendations, Own Sources of Revenue (OSR) of the Panchayats and/or State schemes to meet any deficit, it should be possible to fully wipe out the key infrastructure deficit in rural areas for Gram Panchayat Bhawans.

10. Efforts may also be made by Gram Panchayat to converge Finance Commission funds with Mahatma Gandhi NREGA for taking up other works which are permissible under Mahatma Gandhi NREGA and Finance Commission guidelines, including those for the SHG Collectives at village levels(Maximum Cost Limit-Rs15 lakh), esp. in villages not having Panchayat Bhavan or any other community infrastructure. It is suggested that the same may be made available for community events at a charge decided by the Collective. The cost of such works should be shared between the Mahatma Gandhi NREGA funds and FC funds & other Panchayat Funds equally.

11. In light of the above, we request that suitable instructions may forthwith be issued to officers of concerned Departments to immediately work out their strategy for each District and communicate the same to Ministry of Panchayati Raj and Ministry of Rural Development the number of GP Bhawans proposed to be constructed during current financial year under this special dispensation at the earliest. All the provisions and guidelines of Mahatma Gandhi NREGA should be adhered to during implementation of works taken under convergence with Mahatma Gandhi NREGS.

With warm regards,

Yours sincerely,

10.6.20

(**Sunil Kumar**)

(**Nagendra Nath Sinha**)

Encl. a/a

All Chief Secretaries, States/UTs. (As per list attached)

State	No. of RLBs/TLBs	FFC Unspent Balance (Rs. In crore)	XV FC Fund allocation		Panchayat Bhawans
	as per LGD	As on 01.04.20	Tied	Un-Tied	Estimated deficit
Andhra Pradesh	13,371	715	1,313	1,313	1,615
Arunachal Pradesh*	1,785	-	116	116	1,233
Assam	2,197	2,398	802	802	292
Bihar*	8,387	-	2,509	2,509	1,055
Chhattisgarh	11,655	780	727	727	692
Goa	191	55	38	38	90
Gujarat*	14,292	-	1,598	1,598	227
Haryana	6,197	570	632	632	3,827
Himachal Pradesh	3,226	658	215	215	9
Jammu & Kashmir**	4,290	768			1,257
Jharkhand	4,353	958	845	845	279
Karnataka	6,021	1,967	1,609	1,609	460
Kerala*	941	-	814	814	3
Ladakh**	192	14			-
Madhya Pradesh	22,812	979	1,992	1,992	0
Maharashtra	27,877	3,673	2,914	2,914	3,794
Manipur	161	19	89	89	57
Meghalaya #	8,998		91	91	-
Mizoram #	823		47	47	114
Nagaland #	1,270		63	63	633
Odisha	6,798	2,889	1,129	1,129	0
Punjab	13,261	216	694	694	7,618
Rajasthan	11,341	3,258	1,931	1,931	1,928
Sikkim	185	52	21	21	43
Tamil Nadu	12,523	3,908	1,804	1,804	2,650
Telangana	12,769	915	924	924	4,390
Tripura	591	58	96	96	56
Uttar Pradesh	58,762	4,314	4,876	4,876	26,318
Uttarakhand	7,791	258	287	287	1,601
West Bengal*	3,340	-	2,206	2,206	38
Total	**2,66,400**	**29,422**	**30,375**	**30,375**	**60,279**

Source:

14th FC = PRIASoft

15th FC = XV FC recommendation

Note:

** States not on-board PRIASoft-PFMS Interface; so unconfirmed.*

*** J&K and Ladakh UTs as on 31.10.2019*

 # FFC funds not allocated under 14th FC

Ms. Nilam Sawhney,
Chief Secretary,
Government of Andhra Pradesh,
Secretariat
Building,Hyderabad- 500001.

Shri Naresh Kumar,
Chief Secretary,
Govt. of Arunachal Pradesh,
Secretariat,
Itanagar -791111.

Shri Kumar Sanjay Krishna,
Chief Secretary
Government of Assam,
Secretariat Dispur,
Guwahati-781006.

Shri Deepak Kumar,
Chief Secretary
Government of Bihar
Old Secretariat
Patna-800015.

Shri R. P. Mandal,
Chief Secretary,
Government of Chhattisgarh,
DKS Bhawan, Room no. 207,
Mantralay,
Raipur-492001

Shri Parimal Rai,
Chief Secretary
Government of Goa
Porvoriam - 403001.

Shri Anil Gopishankar Mukim,
Chief Secretary,
Government of Gujarat,
Gandhi Nagar Sachivalaya,
Gandhinagar -382010.

Smt. Keshni Anand Arora,
Chief Secretary,
Government of Haryana,
4th Floor,
Haryana Civil Secretariat,
Chandigarh - 160001.

Shri Anil Khachi,
Chief Secretary
Government of Himachal Pradesh
Shimla -171001.

Shri Sukhdeo Singh,
Chief Secretary,
Government of Jharkhand,
Project Building, HEC,
Ranchi-834002.

Shri T. M. Vijay Bhaskar,

Shri Iqbal Singh Bains,
Chief Secretary
Government of Madhya Pradesh
MantralayaVallabhBhavan
Bhopal-462004.

Shri Ajoy Mehta,
Chief Secretary,
Government of Maharashtra,
Mantralya, 6th Floor,
Madam Cama Road,
Mumbai-400032.

Dr. J. Suresh Babu,
Chief Secretary,
Government of Manipur,
Imphal-795001.

Shri M. S. Rao,
Chief Secretary,
Government Meghalaya,
Civil Secretariat Building,
Shillong -793001.

Shri Lalnunmawia Chuaungo,
Chief Secretary,
Government of Mizoram,
Aizwal – 796001.

Shri Talitemjen Toy,
Chief Secretary,
Government of Nagaland,
Secretariat,
Kohima -797001.

Dr. Asit Kumar Tripathy,
Chief Secretary
Government of Odisha
Odisha Secretariat
Bhubneshwar-751001.

Dr. Karan A. Singh,
Chief Secretary
Government Punjab,
Punjab Civil Secretariat,
Chandigarh -160001.

Shri Devendra Bhushan Gupta,
Chief Secretary,
Government Rajasthan,
Secretariat,
Jaipur -302005.

Shri S. C. Gupta,
Chief Secretary,
Government Sikkim,
Tashiling Secretariat,
Gangtok -737101.

Shri K. Shanmugam,
Chief Secretary,

Government of Tripura,
Civil Secretariat,
Agartala -799001.

Shri Rajender Kumar Tiwari,
Chief Secretary,
Government Uttar Pradesh,
101, Lok Bhawan, UP Civil Secretariat,
Vidhan Sabha Marg,
Lucknow -226001.

Shri Utpal Kumar Singh,
Chief Secretary
Government of Uttarakhand
Dehradun -248001.

Shri Rajiva Sinha,
Chief Secretary,
Government of West Bengal,
Writers' Building,
Kolkata-700001.

eceipt No : 33633/2016/O/O US(CD-II, ME) File No.CD-I-11/145/2015-CD-I

No. J-11016/11/2012-MGNREGA-IV
Government of India
Ministry of Rural Development
Department of Rural Development
(Mahatma Gandhi NREGA Division)

Krishi Bhawan, New Delhi
Dated: 17.2.2016

To

The Spl. SCs/Prl. Secretaries/Secretaries of Rural Development (in-charge – MGNREGA).

Sub : Guidelines for construction of Anganwadi Centres under MGNREGA in convergence with ICDS scheme of Ministry of Women and Child Development.

Sir/Madam,

As per Para 4(1) IV (v) of Schedule – 1, Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), construction of buildings for Anganwadi centres is permitted.

In view of the above, the guidelines for construction of Anganwadi Centres under MGNREGA in convergence with ICDS scheme of MoWCD and other suitable schemes jointly signed by the Secretary, Department of Rural Development, Secretary, Ministry of Women and Child Development and Secretary, Ministry of Panchayati Raj is enclosed herewith for necessary action at your end.

It is requested to share these guidelines with the concerned functionaries for taking up the construction of Anganwadi Centres in the identified/to be identified locations.

Yours faithfully,

17/2/16

(Aparajita Sarangi)
Joint Secretary (MGNREGA)

Encl: As above.

Copy to : PPS to Secretary, DoRD, Ministry of Rural Development/Ministry of Women and Child Development/Ministry of Panchayati Raj for information.

eceipt No : 33633/2016/O/O US(CD-II, ME) File No.CD-I-11/145/2015-CD-I

GUIDELINES FOR CONSTRUCTION OF ANGANWADI CENTRES UNDER MGNREGS IN CONVERGENCE WITH ICDS SCHEME OF THE MINISTRY OF WOMEN AND CHILD DEVELOPMENT

1. CONTEXT:

ICDS

1.1 The Government is committed to repositioning the Anganwadi Centre (AWC) as a "vibrant ECD centre" to become the first village outpost for health, nutrition and early learning. Towards this end, several steps have been taken for improvement and strengthening of ICDS scheme covering programmatic, management and institutional areas.

1.2 Whereas intensive efforts are being made for improving the service delivery at the Anganwadi centres, an estimated 4 lakh AWCs have no building to locate their activities. There is therefore an urgent need to take up construction of buildings for these AWCs. The MWCD has issued guidelines stating that AWCs should be child friendly with all relevant infrastructures and the space should be at least 600 sq. ft. Although there is a scheme for construction of AWCs at a unit cost of @ Rs. 4.5 lakh per unit under ICDS, it was felt that this can best be done through convergence of schemes like MGNREGA.

MGNREGA

1.3 The Mahatma Gandhi National Rural Employment Guarantee Ac(MGNREGA) 2005 aims to provide unskilled manual work to any rural household on demand and employing them on construction of productive assets. Construction of Anganwadi Center is a permissible work as per para 4(1) iv of Schedule I of the MGNREGA 2005.In order to ensure that the focus of these works would remain on creation of wage employment, there is a statutory limit on the cost of material component including the wages of the skilled and semi skilled workers at forty percent of the total project cost at the level of each Gram Panchayat for all GP executed works and at the District level for works taken up by other agencies

1.4 These joint guidelines aim at building a systematic convergence of ICDS, MGNREGS and resources of Panchayati Raj Institutions, especially 14th Finance Commission grant so that every AWC in the Blocks covered under MGNREGA is provided with own building. Each year, there shall be at least 1 lakh AWCs constructed under this convergence for the next 4 years, resulting in construction of 4 lakh AWCs by 2019.

1.5 States/UTs would identify the location for 1 lakh AWCs in the Blocks where there is acute shortage of AWC building. The identification of exact location will be done by the Gram Panchayats which shall form part of District Plan sent through the States to MWCD.

File No.CD-I-11/145/2015-CD-I

eceipt No : 33633/2016/O/O US(CD-II, ME)

1.6 Criteria for selection/identification of AWCs: The following criteria shall be followed:

a. The selection of exact location for construction of AWC buildings will be done by the Gram Panchayats at the village level. It should be sent to the CDPO, ICDS for consolidating all such proposals for further processing.

b. The proposals received from the Gram Panchayats shall be consolidated at the Block level by the CDPO and sent to the District Programme Officer at the District level which shall form part of the District Plan. The criteria of selection shall be mentioned in the District Plan. District Plan for construction of AWC buildings shall also be drawn.

c. All such proposals received at the District Plan shall be consolidated at the State level and the State after considering these proposals shall forward the recommended proposals to the MWCD for consideration.

d. A copy of District Plan approved shall be sent to State Department of WCD.

1.7 Phasing of construction of AWC buildings:

The construction of AWC buildings in convergence with MGNREGA will be executed in phases in the following manner:

a. In 200 High Burden Districts in the first year;
b. In second year, another 200 districts covering the North Eastern and Himalayan States and those States not covered in the first year.
c. 50% of remaining districts in the third year.
d. Remaining districts in the fourth year.

2) OBJECTIVES:

The following are the objectives of this convergence:

(a) To ensure that every AWC in the Blocks covered under MGNREGA is provided with own building.
(b) To serve the objectives of pre-school, nutrition centre, semi-formal public health unit, community centre located in the heart of settlements.
(c) To support generation of human and social capital at the micro level.
(d) To create durable assets in rural areas and improve the infrastructure at village level.
(e) To provide creche facility to MGNREGA workers.
(f) To enhance community participation.
(g) To strengthen the role of Gram Panchayats in implementation of ICDS.

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3) ACTITIVIES THAT CAN BE UNDERTAKEN UNDER MGNREGA IN ACCORDANCE WITH THESE GUIDELINES:

Construction of Anganwadi Centre buildings (AWCs) as per instructions/ guidelines of "Integrated Child Development Services Scheme (ICDS)" administrated by Ministry of Women & child Development (MWCD). Assistance from MGNREGA for AWCs will however, be limited to provisions in Para 7 below.

4. DESIGNS/ SPECIFICATIONS:

4.1. The total land area of the site for construction of AWC building should be 1500-2000 sq. ft. which should cover at least 600 sq.ft. of built up area, boundary wall, kitchen garden, play area, etc. The AWC building should be child friendly with all relevant infrastructure, separate sitting room for children/women, separate kitchen, store for storing food items and child friendly toilets and space for playing of children (indoor and outdoor activities). It should be equipped with safe drinking water. The designs/specifications should adhere to these instruction/guidelines and any further instructions which may be issued by Ministry of Women & Child Development, Government of India, from time to time.

4.2. Local design variation depending on the geo climatic conditions and construction material will also follow instructions/ guidelines mentioned above.

4.3. If any Gram Panchayat chooses to make an AWC of a bigger dimension, same will also be allowed. However, payment from MGNREGA will be restricted to provisions given at Para 7 of these guidelines.

4.4 The Building so constructed will be the property of the Gram Panchayat, which will be responsible for its proper maintenance.

5. NON NEGOTIABLES IN WORK EXECUTION:

a) There shall be no contractors in execution. The work shall be undertaken by the implementing agency, working with the job card holders.

b). Only Job Card holders will be employed for the unskilled part of work.

c) Muster Rolls will be maintained on the worksite, with copies in the Gram Panchayat. All data will also be in public domain and will be entered on nrega.nic.in

d) Wage payments will be done through banks/post office accounts only unless exempted by Ministry of Rural Development.

e) Only eco-friendly building technologies that reduce the use of steel and cement, while constructing pucca buildings shall be used.

f) Transparency and pro-active disclosures related to procurement of material/use of funds.

g) Social Audit.

6 CONFORMITY TO MAHATMA GANDHI NREGA PROCESSES IN PLANNING AND EXECUTION :

6.1 PLANNING :

a. Functionaries of ICDS will participate in the planning exercise being undertaken to identify works with the community participation.

b. The planning process will be Gram Panchayat (GP) based. GP wise and year wise list of AWCs proposed for construction under ICDS phased programme will be put up in the Gram Sabha for approval and inclusion in shelf of projects. The proposal will be sent to CDPO, ICDS for consolidation at the block level.

c. All AWCs proposed for construction under MGNREGS shall be part of the District plan, approved by the Gram Sabha and the Gram Panchayat and shall also be a part of the annual shelf of projects.

d. The proposals received from the Gram Panchayats shall be consolidated at the Block level by the CDPO, ICDS and sent to the District Programme Officer at the District level which shall form part of the District Plan. The criteria of selection shall be mentioned in the District Plan. District Plan for construction of AWC buildings shall also be drawn.

e. All such proposals received at the District level shall be consolidated at the State level and the State after considering these proposals shall forward the recommended proposals to the MWCD for consideration.

f. MWCD would facilitate that wherever Panchayats have their own land, they would make it available for the purpose of construction of AWCs preferably near primary schools in the respective villages.

6.2 ESTIMATES :

(a) An electronic estimate module shall be made available under NREGA Soft, formulated with standard estimate, design and specifications.

(b) After approval of the Gram Sabha and the Gram Panchayat, the concerned Technical Assistant/ Junior Engineer of the Panchayat/Line department will prepare e-estimate for the AWC works using the estimate module following the prevailing SOR for MGNREGA works in the area.

(c) The Technical Sanction will be issued by the concerned authority electronically as per norms/ power delegated for MGNREGA works.

(d) After the TS issued, AS/FS will be issued by the concerned as per norms/ power delegated for MGNREGA works.

6.2 EXECUTION

a. The Project Implementing Agency (PIA) for the construction of the AWC would be decided by the State Government.

However, a list of agencies for execution of construction work shall be short listed and notified by the States. The GPs shall select one of these notified agencies for executing construction of AWC building works. Some of the suggested agencies are State PWD, DRDA, State Housing Boards, Public Sector Undertakings of the Central and State Governments, etc.

b. On receipt of a request from the GP, the PO will issue muster rolls.

c. Every AWC will be treated as an independent work with work I.D. No. and muster roll issued accordingly.

d. A mate may be deployed for every AWC proposed to taken up in a Gram Panchayat at one time. The designated mate will be responsible for the following :

i. Maintain muster for all AWCs in the GP/Village/locality assigned to him.
ii. Record attendance for skilled and unskilled labour.
iii. Ensure that the construction is as per the design/ drawing specified in the TS and will certify to that effect.
iv. The mate will sign the muster roll for attendance and hand it over to the Junior Engineer/ Technical Assistant for further processing.

e. The PIA would be responsible for supply of the material in advance and as per requirement at the site, so that work can be taken up continuously, without a break.

f. The building material required for the building can be produced on the site as a part of the estimate. It shall be ensured that building material shall be eco-friendly minimizing the use of cement and steel.

g. The TA/JE shall record the MB for all such units. The measurement of the work will be made weekly by the concerned TA/JEn as per the norms under MAHATMA GANDHI NREGA. The entries of measurement with assessment of work will be entered in measurement book as well in the muster roll.

h. The completion period of each AWC building shall not be more than 11 months from the date of commencement of the work.

7. MODE OF EXPENDITURE:

7.1 The construction of AWC building will be taken up under MGNREGS using appropriate building technologies, through muster rolls as per MAHATMA GANDHI NREGA process:

7.2 Under MGNREGA expenditure up to Rs. 5 lakhs will be allowed for construction of an AWC building.

Beyond this, the expenditure will be borne from the ICDS scheme of the Ministry of Women and Child Development, including finishing of the building consisting of flooring, painting, plumbing, electrification and wood work etc., as a separate work. For this purpose, concerned authorities at District/Block level shall release the funds, to the PIA concerned.

The ICDS funds for construction of AWC buildings to the extent of Rs 2 lakh per unit will be released by the Central Government in two instalments in the prescribed cost sharing ratio to the State. The State Government, in turn, will release such funds to the Implementing Agency at the District/Block level through PFMS/IFMS. Such Implementing Agency shall further release the money to the executing agency. Since the ICDS funds are to be utilised for finishing of the building consisting of flooring, painting, plumbing, electrification and wood work etc., these funds shall be released by the Implementing Agency at an appropriate time during the course of construction.

If the cost estimate of the AWC building is more than Rs. 7 lakh, the additional cost over and above Rs. 7 lakh shall be met by the State Government from its own resources.

Apart from this, funds from sources like State Finance Commission, Scheduled Castes Sub Plan (SCSP), Tribal Sub Plan (TSP), 14th Finance Commission (for water supply & sanitation) or any other suitable scheme may be used for the construction of AWC building.

7.3 Ministry of Panchayati Raj would facilitate to provide drinking water facilities and sanitation structures at the AWCs wherever the gaps regarding these facilities exist.

8. USE OF ECO-FRIENDLY DESIGNS AND MATERIAL:

The AWC buildings taken up under this project shall be model buildings using eco-friendly materials that conform to the following:

a. The appropriate technologies for the AWC buildings shall be in accordance with the local building traditions, while keeping in view the durability.

b. The use of cement, sand and steel in construction shall be substantially reduced through:

i. Use of local material, local practices for stub foundations or arch foundations or under reamed piles, with suitable design and specifications to address the needs of the relevant seismic zone.
ii. Avoiding the use of concrete columns and beams wherever the span of construction is less than 6 meters in a single-storied structure (or 4 meters in case of more than 2 floors) by using alternate technologies, wherever the soils permit.

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iii. Use of rat-trap bond in all walling work using bricks or blocks 250 mm X 120 mm X 85 mm or equivalent sizes as locally adopted.
iv. Avoiding cement plastering to the extent possible on both sides of the wall.
v. Use of filler slabs using tiles or local material to reduce the concrete.
vi. Avoiding RCC sunshades (chajjas) and replacing with stone/ferro-cement or suitable materials locally available.
vii. Replace windows with honeycomb structures wherever local climate permits.
viii. Use of local material like stone etc. for door and window frame and minimize the use of wood.
ix. Use of local material for flooring like local stone and bricks etc.
x. Use of appropriate mud-based technology.

c. Suitable building material shall be selected for each building (indicative list below) and produced at the site of construction (using the MGNREGA workers) such that the labour component in the building shall be maximized:

i. Mud blocks
ii. Stone and renewable wood (e.g. casuarina)
iii. Compressed and stabilized earth blocks (after due treatment and curing)
iv. Bamboo material
v. Fal-G bricks using the fly ash
vi. Filler blocks
vii. Micro concrete roofing
viii. Funicular roofing, etc.

9. MONITORING AND REPORT:

Progress of construction of AWCs under MAHATMA GANDHI NREGS shall be the responsibility of the District Programme Coordinator (DPC) and the agency implementing ICDS Scheme as mentioned in the respective guidelines. The construction of all AWCs under MAHATMA GANDHI NREGS will be subject to social audit as per MAHATMA GANDHI NREGS and ICDS regulation/guidelines.

(J.K. Mohapatra)
Secretary
Ministry of Rural Development

(S.M. Vijayanand)
Secretary
Ministry of Panchayati Raj

(V. Somasundaran)
Secretary
Ministry of Women & Child Development

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Activity mapping for construction of AWC buildings in convergence with MGNREGA

Activity	Agency/ details
Eligible blocks	All blocks (*IPPE and non-IPPE*) covered under MGNREGA having acute shortage of AWC buildings.
Total AWC Buildings to be constructed.	4 lakh by 2019 @ 1 lakh AWC buildings per year.
Planning for construction	State Government. Planning to be done at GP level and shall form part of District level approved by Gram Sabha and GP as per para 6.1 of the guidelines.
Provision of land	State Government, Panchayats.
Identification of location.	Gram Panchayati at the village level. The proposal shall form part of the District Plan.
Design specifications.	MWCD – minimum area of 600 sq.ft, child friendly building with all relevant infrastructures, separate sitting room, kitchen, store, child friendly toilets, playing space.
Construction of AWC building.	Panchayati Raj institutions.
Provision of Drinking Water & Sanitation	Gram Panchayas - by utilising the funds provided under the 14th Finance Commission to the States/UTs.
Availability of funds under MGNREGA	Upto Rs. 5 lakh for construction of AWC building.
Availability of funds by Ministry of WCD	Upto Rs. 2 lakh for finishing which consists of flooring, painting, plumbing, electrification and wood work, etc at cost sharing ratio of 60:40 between Centre and States (*90:10 for NER and Himalayan States*).
Material : wage component cost ratio under MGNREGA	Cost of material component including wages of skilled and semi-skilled workers at 40% of total project cost at the level of each GP for all GP executed works and at District level for works taken up by other agencies for MGNRES components.
Ownership of building	Gram Panchayat.
Monitoring	District Programme Coordinator and the agency implementing the ICDS scheme.
Maintenance	By Gram Panchayats using their own resources.

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