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Ministry of Housing and Urban Affairs
Government of India

प्रधान मंत्री आवास योजना-शहरी
Pradhan Mantri Awas Yojana-Urban 2.0

Newsletter

Promotion of Innovative Construction Technologies

What's Inside?

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Technology & Innovation Sub-Mission

Under Pradhan Mantri Awas Yojana-Urban, Technology Sub-Mission was set up with an objective to promote Sustainable Technological Solutions for faster and cost effective construction of houses suiting to geo-climatic and hazardous conditions of the country. The Global Housing Technology Challenge (GHTC) - India was initiated in 2019 to identify and mainstream globally best available proven construction technologies that are sustainable, green and disaster-resilient to enable a paradigm shift in affordable housing sector.

Under PMAY-U 2.0, TSM has been further expanded into Technology & Innovation Sub-Mission (TISM) to support innovative design and construction practices and projects. The Sub-mission will assist States/UTs/Cities in deploying disaster resistant and environment friendly technologies for climate smart buildings and resilient housing. TISM will also facilitate preparation and adoption of layout designs and building plans suitable for various geo-climatic zones and will work on following aspects of deisgn and planning:

- **Innovative construction technologies & alternate building materials**
- **Green buildings using passive design architecture and renewable resources**
- **Earthquake and other disaster resistant design and construction**
- **Thermally comfortable, climate smart buildings including simple concept of designs ensuring adequate sunlight and air.**
- **State or region-specific technologies and designs**

> "Why should our country not get better technology? Why should our poor not get long-lasting good houses? Why can't the houses be built quickly?....
> What is the biggest dream of the poor or the middle class people living in the city? Everyone has a dream of owning his own home."
>
> **- Hon'ble Prime Minister**

Centre and State would also partner with interested IITs, NITs, research laboratories and planning & architecture institutes and other technical institutions for developing technical solutions, capacity building and handholding of States/UTs/Cities.

Out of the identified 54 technologies under GHTC India, six Light House Projects (LHPs) using six distinct technologies were finalised to showcase use of these technologies for

further mainstreaming in the country. These LHPs have already been constructed which will be scaled up in PMAY-U 2.0 by undertaking more such projects using innovative construction technologies.

Under PMAY-U 2.0, special innovative/demonstration projects built or constructed using resource efficient, climate responsive, disaster resilient, eco-friendly and sustainable building materials, construction technologies and processes will get Technology Innovation Grant (TIG) upon sanction by the CSMC. This will be a financial grant and will be in addition to the existing funding under PMAY-U 2.0. Under TISM, innovative projects and practices will be supported in challenge mode.

TIG
Technology Innovation Grant

Additional Grant for projects using innovative & alternate technology for speedier, sustainable, resource efficient and disaster resilient construction

TIG @ ₹1,000 per sqm upto 30 sqm on built up area for Affordable Housing in Partnership projects

TIG @ ₹5,000 per sqm (Central & State Government) on built up area for Affordable Rental Housing projects

Message from JS&MD (HFA)
Shri Kuldip Narayan

Dear readers, I am happy to share with you all the first issue of our e-Newsletter on Promotion of Innovative Construction Technologies. This initiative is designed to keep everyone informed about the various technologies adopted by the Ministry in the housing sector for construction of houses/projects. As we continue our journey, it was important for the readers to know that under PMAY-U, more than 15 lakh houses have been constructed using innovative construction technologies.

Moving forward, in the e-Newsletter issues, the features, use of these technologies, latest advancements in construction technologies, highlighting how these technologies, innovations can transform the affordable housing sector, improve efficiency and enhance sustainability and deliver houses at faster pace, will be shared in detail. In each issue, the readers will get updates on different projects of PMAY-U and PMAY-U 2.0, insights about TISM, TIG, among others. Technology innovation forms an important part of the Mission and will continue to. With the launch of PMAY-U 2.0, it will be promoted at large scale.

I would like to thank PMAY-U teams at Central, State and UT level, for their continued hard work and dedication in taking the Mission forward. Let us keep doing our best and make a positive impact together!

Andhra Pradesh - construction of BLC houses using alternate technology

In the State of Andhra Pradesh, beneficiaries of Pradhan Mantri Awas Yojana - Urban have been informed about the benefits of using innovative and alternate technologies for construction of houses. The interested beneficiaries are provided technical guidance by Andhra Pradesh State Housing Corporation Limited (APSHCL) for adoption of these innovative technologies for construction of individual houses. One of the alternate technologies implemented in construction of BLC houses in Andhra Pradesh is Pre-cast RCC Technology

Technology: **Precast RCC** for floor-slab, walling and roofing
No. of units : **84 houses** under BLC component after validation by IIT Delhi in Rajahmundry ULB of East Godavari District
Total cost per sq ft: **₹1,100**

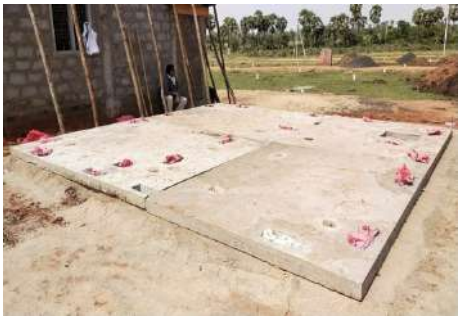
Methodology

The entire house is made with pre-casting using M25 grade concrete.

- Pre-cast building with pre-cast floor foundation is placed on the compacted soil. The foundation system made as a continuous strip of floor which is joint together acts as a raft.
- Pre-cast wall is joined to the Pre-cast floor foundation and the roof is also jointed to the pre-cast walls.
- The compacted soil is protected by plinth protection all along or any damage due to heavy rains and subsequent scouring

Advantages

- Reduced construction time
- Low maintenance cost
- Lighter compared to conventional construction in weight.



Foundation

Wall Panels Erection

Roof Panel Erection

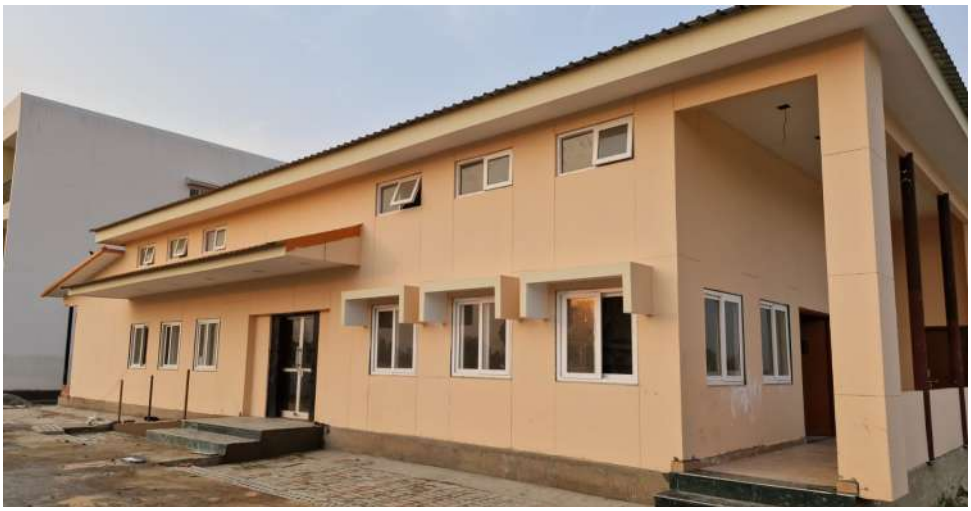
Completed House

Roof cast

Demonstration Housing Project at Ayodhya, Uttar Pradesh

In order to showcase the field application of new emerging technologies, MoHUA took an initiative to construct Demonstration Houses as a part of TSM under PMAY-U through Building Materials and Technology Promotion Council (BMTPC). These Demonstration Housing Projects (DHPs) act as resource projects for providing training and skills to professionals and construction workers on emerging technologies in respective States. A typical DHP comprises of 40 houses with basic & social infrastructure and can be used either as housing project or for any other social/welfare purpose. The land is provided by the State Government and the funding pattern remains the same as in PMAY-U with an additional Technology Innovation Grant (TIG) for promotion of innovative technologies in the field.

The construction of Demonstration Housing Projects in different parts of the country aims to facilitate wide spread dissemination and adoption of both existing proven, emerging and sustainable building materials and technologies.



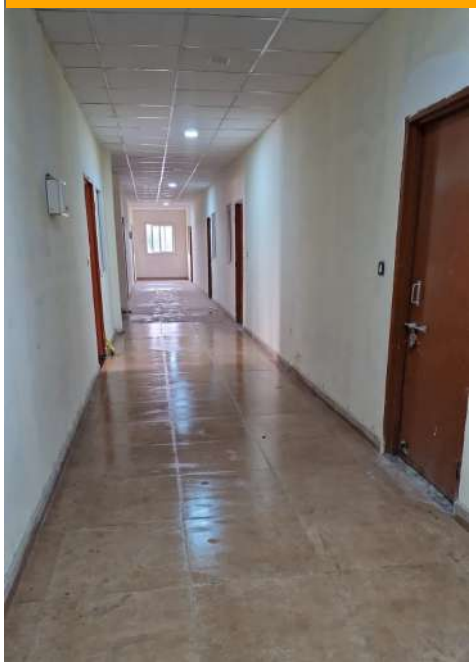
The DHP in Ayodhaya comprising of 40 Dwelling Units in G+2 configuration is constructed using Light Gauge Steel Framework System (LGSF) with Cement Fibre board on both side of walls and infill of rock wool. The project also includes a Community Centre along with all basic infrastructure facilities and provisions.

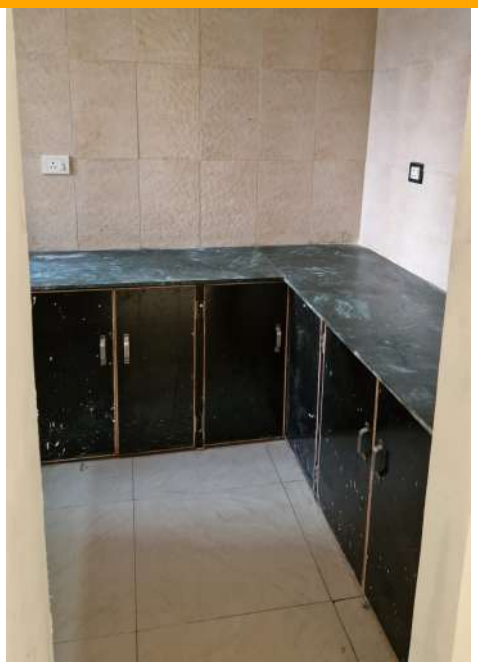
LGSF - about the Technology

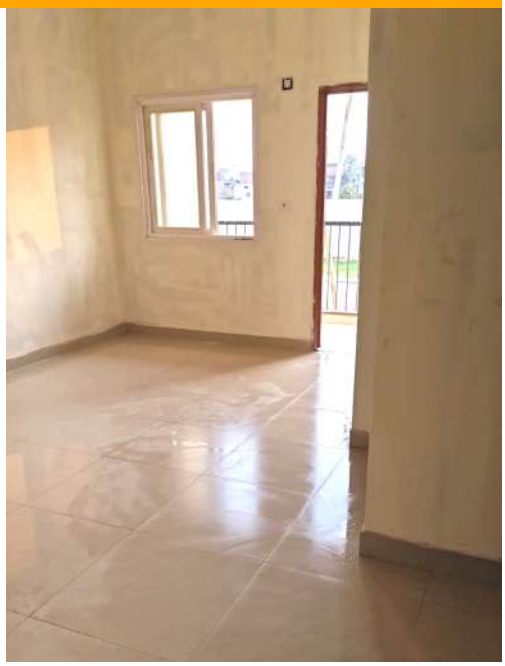
Light Gauge Steel Framed Structures (LGSF) is based on factory made galvanized light gauge steel components, designed as per codal requirements. The system is produced by cold forming method and assembled as panels at site forming structural steel framework of a building of varying sizes of wall and floor. The assembly is done using special types of screws and bolts. LGSF is a well-established technology for residential construction in North America, Australia and Japan and is gaining ground in India. LGSF is typically ideal for one to three storey high buildings, especially for residential and commercial buildings.

Project Profile

- State Level Nodal Agency: SUDA, Lucknow
- Plot area of project: 3600 sqm.
- No. of houses: 40 (G+2)
- Carpet area of each unit: 29.47 sqm,
- Each unit consisting of a room with attached toilet, pantry and balcony
- Includes earthquake resistant features.
- The project includes a dining hall with kitchen & store, common room with toilet, general office, medical room with toilet, care taker room, activity rooms and laundry
- A community Centre having built up area of 342 sqm. consisting of single storey multipurpose hall with kitchen, office, green room, shops and toilet is also provisioned.
- Infrastructure facilities include CC Road, pathways with concrete pavers, water supply work, UGT, septic tank, horticulture work, boundary wall, tube well, drainage & disposal and external electrification using solar panels, rain water harvesting, firefighting system, etc are a part of the project.







The structural design of DHP has been vetted by BHU (IIT) Varanasi. The project has been completed and will be used as destitute widow ashram and an orphanage.

6,240 Houses using Shear wall Technology with CLC blocks at Rampally, GHMC

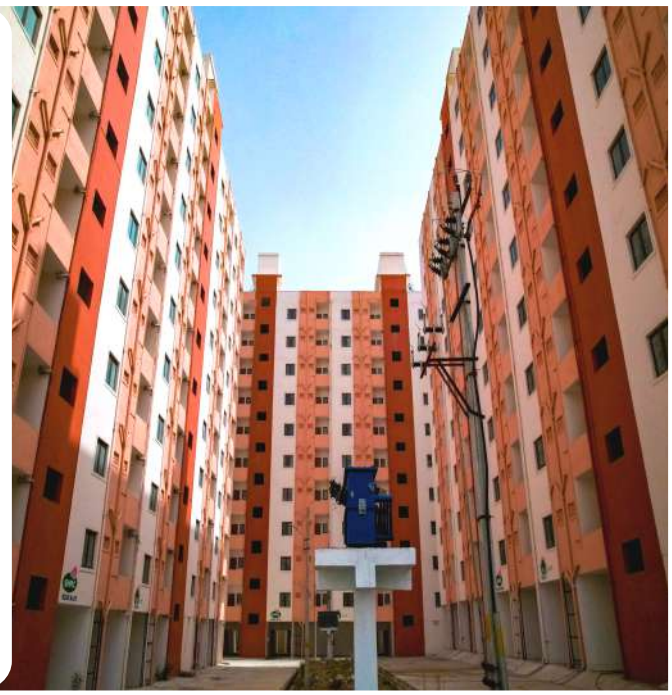
Name of the Project :	Construction of 6,240 DUs of 2BHK houses and providing infrastructure facilities at Rampally of GHMC, Hyderabad
Project cost :	Rs. 539.76 Cr. (Housing: Rs 492.96 Cr. & Infra Cost: Rs 46.80 Cr.)
No. of DUs :	6,240 (52 Blocks)
Built up area :	560 Sft. (52.02 Sqmt)
Carpet Area :	398 Sft. (36.97 Sqmt)
Pattern of Construction :	Shear wall Technology with CLC blocks.
No. of floors :	Stilt+10 Floors

Shear Wall Technology

The construction of housing units has been taken up with Shear Wall technology by using Tunnel formwork imported from Turkey. Shear walls are the vertical elements which resists the horizontal forces like earthquake loads, Window loads etc

Advantages

- Providing lateral strength & stiffness to building
- Resist lateral loads, seismic loads, and vertical forces (Gravity Forces)
- Reduce the lateral sway of the building
- Thinner Walls, fast construction time
- Enough well distributed reinforcement
- Minimize damage to structure and non-structural element



Partition walls using with CLC Blocks (Cellular Light Weight concrete)

Also Known as Foam Concrete, it is made from mixing aqueous foam which is produced from generators into slurry of Cement, Fly ash, water and other additives in precise mixing in foam Concrete.

Advantages

- Light in Weight
- High thermal Insulation
- High Fire Protection
- High sound Insulation
- Low Water Absorption
- Economical

Tunnel Form method for Shear wall construction

Tunnel form is a formwork system that allows the concrete to cast walls and slabs in one operation. It combines the speed, quality and accuracy of factory/off site production with the flexibility and economy of in-situ construction. It gives high quality to require only minimum finishing for direct decoration. The system created an efficient load bearing structure for use in a wide variety of applications.

Advantages

- Quality is enhanced despite the speed of construction.
- The precise, even steel face of the formwork creates a smooth, high quality finish.
- Inbuilt starter provision is made to ensure accuracy of vertical shear walls.

Gujarat - use of Mivan technology (Aluminum Formwork System) in AHP & ISSR Projects

In the State of Gujarat, several AHP and In-Situ Slum Redvlopment (ISSR) Projects are being constructed/ completed using Mivan Construction Technology. Mivan, synonyms to 'Aluminum Formwork System,' is a modern construction technology that involves the use of aluminum alloy formworks for casting concrete. Unlike the traditional RCC method, which relies on timber and plywood, Mivan employs lightweight, high-strength aluminum panels that are easy to handle and reusable.

Sl. No.	PMAY-U Vertical	Name of Project	No. of Houses
1	AHP	Construction of 796 DUs of EWS category in Sanjaynagar Warsiya, Vadodara under AHP component of PMAY-U by Vadodara Municipal Corporation	796
2	ISSR	Construction of 1428 DUs at Sahakarnagar In-Situ Slum Redvlopment under PPP by Vadodara Municipal Corporation	1,428
3	ISSR	Construction of 1,841 DUs at Sanjaynagar Warsiya In-Situ Slum Redvlopment on PPP under PMAY-U by Vadodara Municipal Corporation	1,841

796 DUs
under AHP using Mivan Construction Technology

Benefits of Mivan Technology

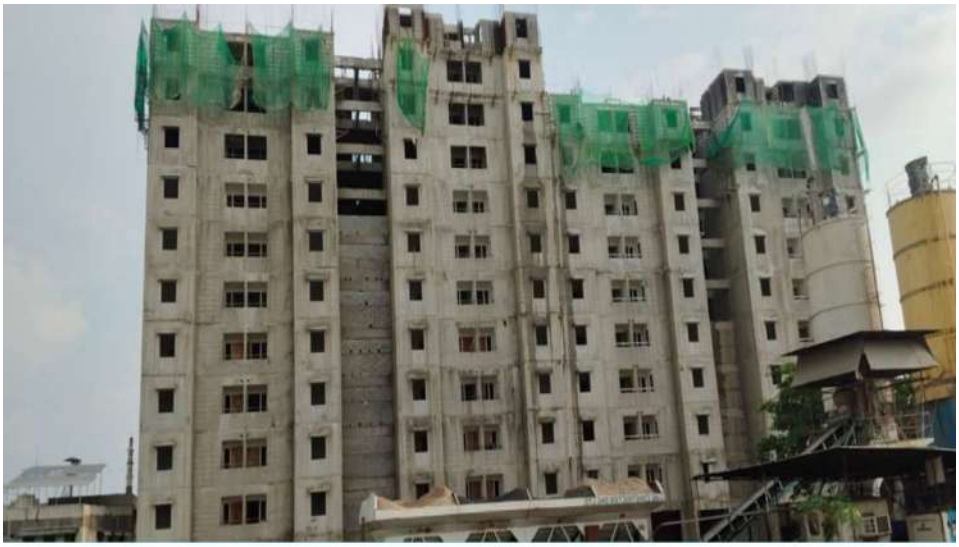
Speed

Mivan technology is faster than traditional concrete formwork because the aluminum formwork is lightweight and can be quickly assembled and disassembled.

Sustainability

Mivan technology reduces on-site waste and enhances material usage.

1,428 DUs
under ISSR using
Mivan Construction
Technology

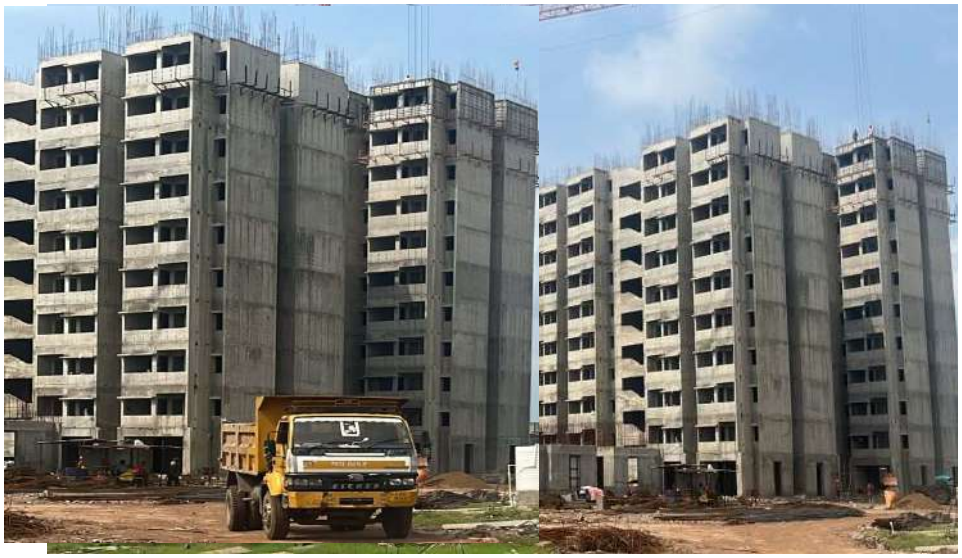


Finishing

Mivan construction produces excellent wall and slab finishes that don't require plastering.

Maintenance

Mivan construction requires less maintenance than traditional formwork



1,841 DUs
under ISSR using
Mivan Construction
Technology

Safety

Mivan formwork can be installed quickly and with fewer workers, which reduces the risk of injuries.

Efficiency

The formwork is easy to handle and reusable, and it can be used to rapidly construct multiple units.

LIGHT HOUSE PROJECTS

GLOBAL HOUSING TECHNOLOGY CHALLENGE INDIA

Hon'ble Prime Minister laid the foundation stone of six Light House Projects (LHPs) on 1st January 2021. LHPs are model housing projects constructed using shortlisted proven technologies under GHTC-India, suitable to diverse geo-climatic and hazardous conditions of the region. All LHPs, except LHP Agartala have been completed and inaugurated by Hon'ble Prime Minister. The LHP Agartala is in advanced stage of construction.

Glimpses of Light House Projects (LHPs)

LHP CHENNAI

Technology: Precast Concrete Construction System-Precast Components Assembled at Site

No. of Houses : 1,152

Country of Origin : Finland/USA

LHP RAJKOT

Technology: Monolithic Concrete Construction using Tunnel Formwork

No. of Houses : 1,144

Country of Origin : France

LHP INDORE

Technology: Prefabricated Sandwich Panel System with Pre-engineered Steel Structural System

No. of Houses : 1,024

Country of Origin : China/ Japan

LHP LUCKNOW

Technology: Stay In Place PVC Formwork with Pre-Engineered Steel Structural System

No. of Houses : 1,040

Country of Origin : Canada

LHP RANCHI

Technology: Precast Concrete Construction System - 3D Volumetric

No. of Houses : 1,008

Country of Origin : Germany

LHP AGARTALA

Technology: Light Gauge Steel Framed (LGSF) System with Pre-Engineered Steel Structural System

No. of Houses : 1,000

Country of Origin : New Zealand/ Kenya