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निर्माण सारिका

A Newsletter of BMTPC

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BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

Ministry of Housing & Urban Poverty Alleviation, Government of India

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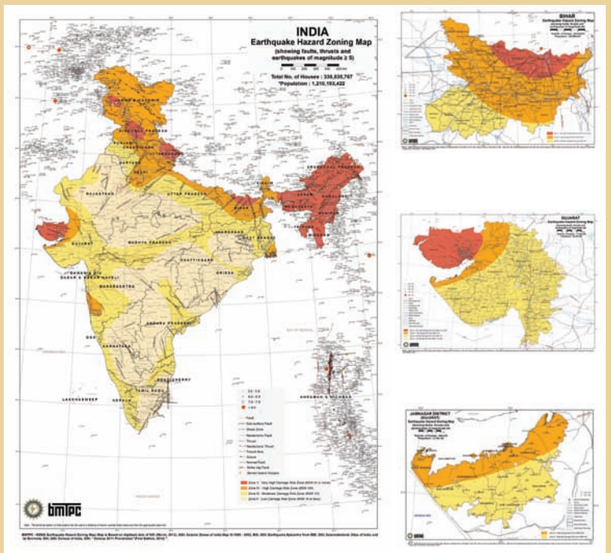
Demonstration Housing Project at Rae Bareli, U.P.

In order to demonstrate and popularise cost effective, alternate and disaster resistant technologies, the Council completed Demonstration Houses at Barwaripur, Rae Bareli using alternate technologies at the land provided by the local administration. In this Project, construction of 24 dwelling units (G+1) alogwith onsite infrastructure development were undertaken having each unit with plinth area of 32 sqm consisting of one living room, one bedroom, kitchen, one separate bath and WC with infrastructure facilities. The Demonstration Housing Project includes onsite infrastructure facilities like Pathways, Underground water tank, Boundary wall, Landscapping work, Biodigester toilets, etc. The Demonstration Housing Project was handed over to the local administration in February, 2014. The cost of construction for the project was Rs.850 per sqft. which is 10-15% less than the prevailing cost of conventional construction in the area.

Preparation of Earthquake Hazard Maps

BMTPC is preparing updated Earthquake Hazard Zoning Maps based on the earlier published Vulnerability Atlas of India for National Disaster Management Authority (NDMA). The Council has completed preparation of updated Maps for the whole country upto district level based on the Survey of India administrative boundary data. These maps include latest data from India Meteorological Department, Geological Survey of India, Bureau of Indian Standards, Survey of India and Census of India. These maps will also include data of sub-divisions (being obtained from Census). Earthquake Hazard Maps consists of Seismic zones as per IS 1893 (Part1) – 2002; Boundaries as per 2012 Survey of India data; Epicentres of earthquakes of 5.0 and above as per IMD data; Seismo Tectonic details as per Seismotectonic Atlas of India of GSI and Housing & Population data as per Census 2011 from Census of India. The State specific atlases are also being prepared under the project.



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From the Desk of the Executive Director

In order to create enabling environment for affordable housing for all, a clarion call from the promotion council like ours would be to look into technological interventions in construction sector also besides land, finance & policy issues. It has been seen that technology plays an important role in every sphere of life and same is applicable into construction field also. I firmly believe that new prefab and factory made building components can bring not only speed and quality but also cut down the cost of construction considerably provided a market is created. We need to take a chance and give opportunity to new technologies, if we really want to provide affordable housing for all.

Having realized this, some of the States are embracing new technologies for affordable mass housing by bringing technology neutral tender. The worthwhile examples are use of shear-wall (monolithic) technology, waffle-crete system, 3S system and EPS panel system by different States. The use of light gauge steel and aluminium sections are also picking up as viable alternative to age-old RCC framed construction.

These new systems have the potential to bring sea-change in construction sector as there are distinct advantages associated with them. To take them forward, all we require is will to innovate, think out of box and take apt decision.

(Dr. Shailesh Kr. Agrawal)

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Building Materials & Technology Promotion Council, New Delhi

Workshop on Emerging Building Materials & Construction Technologies, 7 March 2014 at Bangalore

BMTPC together with Karnataka Slum Development Board (KSDB) organised one day workshop on Emerging Building Materials and Construction Technologies on March 07, 2014 at Bangalore in order to disseminate knowledge on emerging technologies in Southern Region being evaluated and promoted by BMTPC. The KSDB is the premier State agency primarily entrusted with the task of slum rehabilitation in the entire State, hence, itself a promising client for such technologies. Total eight technology providers took part in the workshop to showcase their technologies & building systems and interacted with the stakeholders so as to get the feedback and understand the aspirations of the masses as regards quality housing. The participants included policy makers, engineers from various State Govt. Departments and representatives from Developers/Contracting agencies. The participants took keen interest in understanding the intricacies of the emerging technologies for possible field level application in social mass housing.

Consultation Meet on Standards & Specifications for Affordable Housing, 26 March 2014 at Ahmedabad

With the aims of "Housing to All by 2020" and housing shortage to the tune of 18.78 million (2012), there is need for faster planning and construction of dwelling units. With varying geo-climatic conditions hazard scenario and availability of building materials, it is required to develop regions specific Standard & Specification of dwelling units with different alternate technologies, which may serve as useful guidelines for designers while planning the dwelling units. BMTPC has initiated the exercise, in consultation with State Governments to develop such guidelines. This also aims to standardize basis module of spare dimension for different type of building material component and system. In this regard, a Consultation Meet on Standards & Specifications for Affordable Housing (Western Region) was organised by BMTPC on 26 March 2014 at Ahmedabad. Around 75 participants participated in the Consultation meet including technology providers.

"Creating Enabling Environment for Affordable Housing for All"

Alternate Building Materials & Technologies

Calcium Silicate Bricks

Calcium silicate bricks derive their strength from the formation of calcium silicate hydrates in crystallized form by the reaction of hydrated lime with active siliceous materials. Such active materials include finely ground sand/siliceous rock and fly ash. The chemical reaction leading to formation of calcium silicate hydrates (and calcium aluminates in case of addition of fly ash) are carried out under autoclaving at elevated temperature and pressure of steam. These bricks may be used for masonry construction just like burnt clay bricks and may also be used as facing bricks.

Bricks shall be solid, compact and uniform in shape with or without frog. Bricks shall be free from visible cracks. Bricks shall have rectangular faces with sharp and square corners and shall be uniform in colour.

Materials

Bricks shall be made of finely ground sand/siliceous rock with clay and silt content less than 5 percent and lime. Lime shall conform to class C hydrated lime as per IS 712. Additives – Any suitable additive.

Dimensions and Tolerances: Shall conform to:

Dimensions Actual Size	Frog size
190mmx90mmx90mm	100mm x 40mm and 10mm x 20mm deep on one of its flat side.
190mmx90mmx40mm	

Brick shall have tolerance on length ± 3 mm, breadth and height ± 2 mm.

Compressive Strength: The compressive strength of any individual brick shall not fall below the minimum average compressive strength specified for the corresponding class of bricks by more than 20 percent.

Drying Shrinkage: The average shrinkage of calcium silicate bricks when tested as per IS 4139 shall not be greater than that given below:

Class Designation	Drying Shrinkage (% of Wet Length)	Average Compressive strength (N/mm^2)	
		Not less than	Less than
75	0.06	7.5	10
100	0.06	10	15
150	0.04	15	20
200	0.04	20	-

For further details refer:
- Indian Standard IS 4139 :1989
- Standards and Specifications published by BMTPC, New Delhi.

Emerging Technologies for Building Construction

Monolithic Concrete Technology using Plastic/Aluminium Composite Formwork

In Monolithic Construction System, traditional column and beam construction is eliminated and instead wall and slabs are cast in one operation at site by use of specially designed, easy to handle (with minimum labour and without use of any equipment) formwork. Rapid construction of multiple units of repetitive type can be achieved with a sort of assembly line production by deployment of a few semi-skilled labour.

Monolithic construction may be considered as shear wall type construction if sufficient number of cross walls are available. The walls shall be designed for vertical loading, in-plane shear loading and out of plane loading due to wind and earthquake actions. For out of plane loadings, the walls can be assumed to be supported by floor slabs / diaphragms, and the cross walls, and continuity can be assumed wherever applicable.

Materials Requirements

- Steel reinforcement and concrete used shall comply with the requirements of IS 456:2000 – Code of Practice for plain and reinforced concrete (fourth revision).
- Special type of Formwork System is designed based on the building plan & structure.
- Good flowing concrete shall be used in construction to avoid honey combing / defects in these elements. Self compacting concrete with suitable admixtures is recommended.

Superstructure

- The detailing at the joints of wall panels and between all and floor / roof panels shall ensure continuity.
- The detailing requirements as per IS 456:2000 – Code of Practice for plain and reinforced concrete (fourth revision) and IS 13920:1993 – Code of Practice for ductile detailing of reinforced concrete structures subjected to seismic forces, as applicable shall be complied with.

Limitations

- Post construction alterations are not possible.
- The service lines (electric conduits and water lines) has to be pre-planned and placed before concreting is done.
- Initial investment is high.

Skill Development and Capacity Building

Training, Capacity Building and Certification Programme For Building Artisan

The Council prepared "Building Artisan Certification System". The system consist of eight certificate modules including (1) Assistant Mason, (2) Mason, (3) Disaster Resistant Construction (4) RC Construction (5) Concreting, (6) Bar Bending, (7) Repairs of Masonry Structures, and (8) Alternate Building Technologies. Out of these eight modules, the pilot assessment of candidates is being carried out under this project for the Assistant Mason and Mason Certificates.

Six batches of Training Programmes were organized in the following villages near Ahmedabad, Gujarat:

- Village Hasila (5-8 February 2014);
- Village Palundra (21-22 February 2014);
- Village Manipur (3-5 March 2014);
- Village Haisla (6-9 March 2014);
- Village Shiyawada (11-22 March 2014);
- Village Kerala (23-26 March 2014).

Total 74 construction workers participated in the four day training and certification programme in different batches. Out of these 68 were qualified (40 as assistant masons and 28 as main masons).

Training Programme on Alternate and Cost-effective Housing Technologies for Prospective Engineers

In addition to the two Training Programmes organised for Masons on Alternate and Cost Effective Housing Technologies at the site of demonstration housing project at Rae Bareli, U.P., a Training Programme was also organized for prospective engineers on 8 February, 2014 wherein 70 civil engineering students from KNIT Sultanpur were provided hands-on training. The participants were given indepth knowledge about the application of the following alternate technologies:

- Rat Trap Bond in Brick Masonry
- Reinforced Brick Concrete Slab
- Filler Slab using Earthen Pots as fillers
- Precast RCC door frames
- Precast Ferro-cement steps
- Interlocking pavers on pathways
- Bio-digester for sewerage.