

Annual Report

2016–2017



bmtpc

Building Materials and Technology Promotion Council
Ministry of Housing & Urban Affairs
Government of India

Annual Report 2016-2017



Building Materials & Technology Promotion Council
Ministry of Housing & Urban Affairs, Government of India
Core-5A, First Floor, India Habitat Centre, Lodhi Road
New Delhi – 110003

FOREWORD

It is my honour and pride to present the Twenty-seventh Annual Report of my organization i.e. the Building Materials & Technology Promotion Council for the year 2016-2017, an autonomous organization under the Ministry of Housing & Urban Affairs, Govt. of India.

Since its inception in 1990, BMTPC has completed 27 years of service to nation with a commitment to promote sustainable building materials and construction systems. In this journey of promotion of innovative systems other than conventional brick & concrete construction, BMTPC had to struggle really hard with rejuvenated efforts several times so as to bring paradigm shift in use of innovations in the construction sector as regards sustainable materials and alternate systems. Even since PMAY(U) was launched in June 2015, the quest to bring innovative construction systems around the globe which can not only fast track delivery of quality sustainable houses but also comply with structural, functional and safety norms stipulated in Indian Standards gained importance. Further, in order to accomplish the ardent task of providing houses to each household by 75th year of independence under PMAY(U), the best construction practices which are time tested and proven elsewhere need to be identified, studied, evaluated & certified so that they can be straightway transplanted to suit Indian geo-climatic conditions. BMTPC being promotion council for good construction practices, seized the opportunity and identified, evaluated and shortlisted emerging construction systems for mass housing. There has been good response from public and private agencies and State Governments e.g. Andhra Pradesh, Chhattisgarh, Gujarat, Kerala, Maharashtra, Telangana, Odisha, Jharkhand and Tamil Nadu, have started incorporating these new systems in their construction projects. Some of Central Govt. Deptts. such as MES, Ministry of Defence, CRPF, BSF, Police Housing Corporation, CPWD, NBCC, HPL, IITs have started using emerging technologies.

One of the important components of technology transfer is demonstration construction using alternative materials and technologies. As a new initiative, BMTPC is constructing Demonstration Housing Projects in different parts of India using emerging technologies with the objective of spreading awareness about new technologies and disseminate technical know-how in the States under the Pradhan Mantri Awas Yojana (Urban) – Housing for All Mission. The construction work of Demonstration Housing Project at Nellore, Andhra Pradesh has been completed. The work for construction of demonstration houses at Bhubaneswer, Odisha; Biharshariff, Bihar; Aurangabad Jagir, Lucknow, Uttar Pradesh; and Hyderabad, Telangana has been started. Besides, the sites for three DHP's at Dehradun, Uttrakhand; Distt. Kanchipuram, Tamil Nadu and Guwahati, Assam have also been identified and requests from State Govts. of Manipur, J&K, Kerala, Punjab and Jharkhand to undertake the Demonstration Housing Projects have been received. NHB and DFID have also become partners with BMTPC in demonstration housing projects being implemented in three States namely Odisha, Bihar & Uttar Pradesh and providing partial financial support. The state level sensitization programmes & workshops are being organized along with hand holding of state engineers so that emerging technologies can be mainstreamed. While writing this report, more than 2 lakh houses are being constructed in different parts of the country under PMAY(U) using these new systems.

Through Gazette Notification (No. I-16011/5/99 H-II in the Gazette of India No. 49 dated December 4, 1999), BMTPC is authorized to evaluate and certify prospective construction systems & new materials and products. During the year, emerging technologies namely, Concrewall System, Insulating Concrete Forms and Prefabricated Fibre Reinforced Sandwich Panels have been awarded certificate under the Performance Appraisal Certification Scheme (PACS) of BMTPC and a number of them are being evaluated namely Rising EPS Cement Panels, Plastic Honeycomb Panels, Stay-in-Place Formwork System, GCI Wall Forms, Easywalls Hollowcore Concrete Wall Panels and RCC Prefab Universal Building System etc. The Council is preparing 2nd edition of Compendium of Prospective Emerging Technologies which will cover around 16 emerging technologies. Till date, BMTPC has issued Performance Appraisal Certificates (PAC) for 46 products/systems covering various items.

BMTPC has been proactively supporting and working as a technical resource institution for Ministry of Housing & Urban Affairs's Mission schemes and extending its technical support for appraising, monitoring, review of Third Party Inspection & Monitoring (TPIM) and handholding of ULBs under PMAY(U), RAY, JNNURM, NULM & 10% Lumpsum Provision for NER States.

The Ministry of Housing & Urban Affairs has set up a Technology Sub-Mission under Pradhan Mantri Awas Yojana (Urban) - Housing for All Mission which is working on promotion and large scale adaption of new construction technologies and alternate building materials by the State Govts. in collaboration with IITs and NITs. BMTPC is working as secretariat of the Technology Sub-Mission. The Council has been designated as one of the agencies for scrutiny of the projects received under Housing for All (Urban) from various States. BMTPC has also been entrusted with the task of educating ULBs & beneficiaries regarding earthquake resistant design and construction specifically for States and regions falling in high seismic zone i.e. IV & V under PMAY(U).

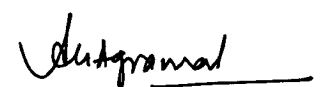
One of the strength of BMTPC has been Disaster Mitigation & Management. BMTPC is committed to promote the proactive approach towards it and has been in the forefront in educating professionals and creating mass awareness amongst various stakeholders including common man. BMTPC brought out the updated Earthquake Hazard Zoning Maps of India, all the States/UTs and district level maps for NDMA. Development of Mobile Application of the updated Earthquake Hazard Zoning Maps and revision of Vulnerability Atlas of India has also been initiated. Like previous year, BMTPC, IIT Roorkee and NORSAR, Norway also organized Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8 at New Delhi. Under the guidance of Ministry of HUA, BMTPC in association with UNDP brought out the "Disaster Risk Reduction : A Handbook for Urban Managers" to the help them in understanding risk concept of sensitive planning and ensuring safety against disasters.

The Council also participated in the HUDCO BuildTech 2016 and put up an exhibition on Alternate and Emerging Building Materials and Construction Systems during India International Trade Fair at Pragati Maidan, New Delhi. Like preceding years, on the occasion of World Habitat Day 2016, the Council brought out the Special Issue of "Nirman Sarika" on the theme "Housing at the Centre" chosen by the UN-Habitat for the year and organized a painting competition for Differently Abled Children and the winners were felicitated during the World Habitat Day celebrations.

In order to strengthen the knowledge base in the construction sector, the Council has brought out a number of publications during the year namely, Guidebook on Earthquake Resistant Design and Construction, Pocket book on Emerging Construction Systems and Margdarshika for Masons – Rajmistry ke liye Dishanirdesh. With a focus on development and promotion of innovative building technologies, specific R&D projects have also been initiated. The website of the Council is being updated regularly for inclusion of latest activities and information. There is good response on website in the form of general enquiry about product and services. A Knowledge Portal for Sustainable Habitat is the recent contribution made by BMTPC to bring all innovations related with habitat under one platform.

It is my privilege to acknowledge the valuable guidance, support and encouragement received from the President and Members of the Board of Management, the Chairperson and Members of the Executive Committee and Ministry of Housing & Urban Affairs for various programmes undertaken and executed by the Council. BMTPC is grateful to NITI Aayog, Parliamentary Standing Committee on Urban Development, PMAY(U)-HFA Mission Directorate, MoHUA, various State Govts., Municipal Corporations and Urban Local Bodies, Ministry of Home Affairs, Ministry of DONER, NDMA, NIDM, MOS&PI, DST, CSIR, IITs, CEPT, IPIRTI, CBRI, SERC, ICI, IIHRD, SEP, SPA, HUDCO, BIS, NHB, NCHF, HPL, CGEWHO, CPWD, NSIC, CIDC, BIPARD, UNDP, UNIDO, RICS school of Built Environment, TAC and UN-Habitat for their continued support and interest in strengthening and supporting the efforts of the Council over successive years.

I would also like to place on record my deep appreciation for the cooperation of officers of BMTPC and its staff members for timely implementation of the Council's activities. The Council acknowledges the support and cooperation received from all officers and staff members of the Ministry of Housing & Urban Affairs, which helped the Council to meet its mandate and further its objectives.



(Dr. Shailesh Kr. Agrawal)
Executive Director

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Vision

“BMTPC to be world class knowledge and demonstration hub for providing solutions to all with special focus on common man in the area of sustainable building materials, appropriate construction technologies & systems including disaster resistant construction.”

Mission

“To work towards a comprehensive and integrated approach for promotion and transfer of potential, cost-effective, environment-friendly, disaster resistant building materials and technologies including locally available materials from lab to land for sustainable development of housing.”

INTRODUCTION

Building Materials & Technology Promotion Council (BMTPC), established in 1990, is an autonomous grant-in-aid organisation of the Ministry of Housing & Urban Affairs, Govt. of India. BMTPC is mandated to promote and transfer cost-effective, environment-friendly and energy-efficient building materials and housing technologies including disaster resistant construction practices for large scale field application.

In order to meet its objectives, BMTPC initiated several multi-faceted activities enshrined in the mandate of the Council so as to create enabling environment for sustainable building construction. Over the years, the Council has been striving to promote innovative, cost-effective, environment-friendly and energy-efficient alternate building materials and technologies at grass-root level. The Council has also embarked upon the field level application of these materials and technologies through demonstration construction of model demonstration housing and other structures such as informal markets, community centre, etc. in different parts of India. In its technology development, promotion and dissemination efforts, the Council has promoted various technologies for use in housing and building construction including bamboo based housing solutions. The Council also constructed demonstration structures in the North Eastern Region and helped in setting up Bamboo Mat Production Centres to make available the bamboo mats for the production of bamboo mat related products such as corrugated sheets, bamboo boards, etc. leading to employment generation.

The Council in recent years has reoriented its approach towards promotion of not only sustainable technologies through intensive evaluation, dissemination but also propagating emerging prefabricated housing technologies from within the country and abroad for social mass housing. The Council is working towards bringing various emerging technologies, which are successful elsewhere in the world, to bring cost, economy, quality, environmental protection and speed in housing construction.

BMTPC is actively involved in disaster mitigation activities and working in close liaison with NDMA, NIDM and other related Institutions. Apart from bringing out the first ever Vulnerability Atlas of India in 1997 and 2006, the Council is working on third edition of its Vulnerability Atlas of India based on 2011 census data. Besides, the Council regularly publishes valuable guidelines/ manuals on disaster resistant construction. In order to create awareness regarding earthquake resistant design

and seismic retrofitting, the Council has undertaken retrofitting of few buildings and organised training programmes for professionals.

Housing for All (Urban) Mission will be implemented during 2015-2022 and this Mission will provide central assistance to implementing agencies through States and UTs for providing houses to all eligible families/beneficiaries by 2022. Ministry of Housing and Urban Affairs has set up a Technology Sub-Mission which would work on Promotion and Adaption of new construction technologies and alternate building materials. During the operationalization of Technology Sub-Mission, it is felt that there will be need of support from various institutes like IITs, NITs and State engineering colleges for extending technical support in the matters pertaining to technology, technical audit, monitoring, training and testing etc. BMTPC is working as secretariat of the Technology Sub-Mission. The Council has been designated as one of the agencies for scrutiny of the projects received under Housing for All (Urban) from various States. The Council has also worked as one of the Appraisal and Monitoring Agencies for Projects under Rajiv Awas Yojana (RAY) and Jawaharlal Nehru National Urban Renewal Mission (JNNURM) of the then Ministry of HUPA.

Objectives

- **Building Materials & Construction Technologies:** To promote development, standardization, mechanization and large scale field application of proven innovative and emerging building materials and technologies in the construction sector.
- **Capacity Building and Skill Development:** To work as a Training Resource Centre for capacity building and promotion of good construction practices to professionals, construction agencies, artisans and marketing of building technologies from lab to land.
- **Disaster Mitigation & Management:** To promote methodologies and technologies for natural disaster mitigation, vulnerability & risk reduction and retrofitting/ reconstruction of buildings and disaster resistant planning for human settlements.
- **Project Management & Consultancy:** To undertake project management and consultancy services including appraisal, monitoring and third party inspection of housing projects under the various Central/State Schemes.

Thrust Areas

- Identification, evaluation and promotion of proven and emerging housing technologies available for housing sector nationally and internationally.
- Promoting speed, economy, efficiency and quality in construction.
- Creating enabling eco-system for mass application of technologies through upscaling of technologies, know-how acquisition, absorption and dissemination.
- Field level application of environment-friendly, energy-efficient and disaster resistant technologies for proven, locally available and emerging technologies, through demonstration construction.
- Formulation of Specifications, Schedules, Standards on proven building materials/technologies including emerging technologies/systems.
- Documentation of benefits, durability and acceptability of cost effective and innovative building materials and technologies.
- Skill upgradation of professionals and construction workers through capacity building programmes, training programmes, seminars, conferences, workshops, exhibitions nationally as well as internationally.
- Promoting disaster resistant construction technologies.
- Appraisal, monitoring and third party inspection of housing projects including undertaking project management and consultancy services.
- Publication of user manuals, guidelines, compendiums, directories, brochures, techno-feasibility reports, video films, demonstration CDs, interactive website, blogs including documentation of success stories.

Administration and Management

BMTPC follows a three-tier system for discharging its administrative and technical duties as given below:

- i. Board of Management headed by Hon'ble Minister of Housing & Urban Affairs

- ii. Executive Committee headed by Secretary, HUA
- iii. Executive Director

The Board of Management of the Council consists of 17 Members from various Ministries and related organisations. The Executive Committee consists of 9 Members from Ministry of Housing & Urban Affairs, Housing & Urban Development Corporation (HUDCO), Central Building Research Institute (CBRI) and Technical Experts. The list of members of the Board of Management and Executive Committee is given hereunder:

Board of Management (as on 31.3.2017)

S.No.	Members	
1	Shri M. Venkaiah Naidu Hon'ble Minister of Housing & Urban Poverty Alleviation, Urban Development and Information & Broadcasting, Government of India	President
2	Shri Rao Inderjit Singh Hon'ble Minister of State for Housing & Urban Poverty Alleviation and Urban Development Government of India	Vice-President
3	Dr. Nandita Chatterjee Secretary Ministry of Housing & Urban Poverty Alleviation, Government of India	Vice-President
4	Shri Ashok Kr. Jain Senior Advisor (HUA) Niti Aayog, Government of India	Member
5	Dr. M. Ravi Kanth Chairman & Managing Director HUDCO	Member
6.	Shri K.K. Jalan Secretary, Ministry of Micro, Small & Medium Enterprises, Government of India	Member
7	Prof. Ashutosh Sharma Secretary, Ministry of Science & Technology, Government of India	Member
8	Shri Naveen Verma Secretary, Ministry for the Development of North Eastern Region, Government of India	Member
9	Shri R.K. Jain Secretary National Disaster Management Authority, Government of India	Member
10	Dr. Girish Sahni Director General Council of Scientific & Industrial Research Government of India	Member
11	Shri Abhai Sinha Director General Central Public Works Department Government of India	Member
12	Prof. K.N. Satyanarayana Director Incharge, IIT, Tirupati	Member

S.No.	Members	
13	Prof. Sudhir K. Jain Director, IIT, Gandhinagar	Member
14	Shri Rajiv Ranjan Mishra Joint Secretary (Housing) Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
15	Ms. Jhanja Tripathy Joint Secretary & FA, Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
16	Shri Amrit Abhijat Joint Secretary & Mission Director(HFA) Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
17	Dr. Shailesh Kr. Agrawal Executive Director, Building Materials & Technology Promotion Council	Member Secretary

Executive Committee (as on 31.3.2017)

S.No.	Members	
1	Dr. Nandita Chatterjee Secretary, Ministry of Housing & Urban Poverty Alleviation, Government of India	Chairperson
2	Shri Rajiv Ranjan Mishra Joint Secretary (Housing) Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
3	Ms. Jhanja Tripathy Joint Secretary & FA, Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
4	Shri. Amrit Abhijat Joint Secretary (HFA) Ministry of Housing & Urban Poverty Alleviation, Government of India	Member
5.	Dr. M. Ravi Kanth Chairman & Managing Director, Housing & Urban Development Corporation	Member
6.	Dr. N. Gopalakrishnan Director Central Building Research Institute, Roorkee	Member
7.	Prof. Pradipta Banerji Head, Department of Civil Engineering Indian Institute of Technology Bombay, Mumbai	Member
8.	Shri J.S. Gopinath Director & Chief Architect JSKM Architecture, Interiors Qube, Hyderabad	Member
9.	Dr. Shailesh Kr. Agrawal Executive Director, Building Materials & Technology Promotion Council	Member - Secretary

MAJOR INITIATIVES AND ACTIVITIES DURING THE YEAR 2016-2017

I. MODEL DEMONSTRATION CONSTRUCTION USING ALTERNATE TECHNOLOGIES

1. Demonstration Housing Projects using Green/Emerging Technologies in different parts of the country

The Council has been promoting proven and emerging building materials & technologies in different regions of the country through identification, evaluation, standardization, certification, capacity building & training and field level application of such technologies. The council, during recent past, has constructed a number of demonstration houses in various parts of the country. The efforts of the Council have helped in building up confidence and acceptability of proven and emerging technologies in public & private construction agencies, professionals etc.

As a new initiative, BMTPC is constructing Demonstration Housing Projects in different parts of India using emerging technologies with the objective of spreading awareness about new technologies and disseminate technical know-how in the states under the Pradhan Mantri Awas Yojana (Urban) – Housing for All Mission. The status of the projects at various locations are given below:

(a) Demonstration Housing Project at Nellore, Andhra Pradesh

BMTPC has completed construction of 36 Demonstration Houses (G+1) using GFRG panel technology and a Community Centre building using alternate technologies namely flyash blocks, filler slab, etc. at Saraswathi Nagar, Chowtapalem Village, Venkatachalam Mandal, SPS Nellore, Andhra Pradesh. The Demonstration Housing Project was designed by IIT Madras who has certified GFRG technology for mass housing. The Government of Andhra Pradesh had allotted the land for construction admeasuring 1.85 acres.

The Demonstration Housing Project was inaugurated by Shri M.Venkaiah Naidu, the then Hon'ble Minister of Housing & Urban Poverty Alleviation, Urban Development and Information & Broadcasting on September 3, 2016. The project was implemented by BMTPC in collaboration with IIT Chennai, FRBL Kochi and APSHCL, AP. The details of the project are as follows:

Project Profile

- No. of houses : 36 (G+1)
- Built up area of each unit : 450 sq.ft.
- Each Unit consists of One living room, one bedroom, kitchen, one separate bath and WC.
- One Community Building in an area of 6900 sq.ft.
- Includes Earthquake Resistant Features.

Technologies/Specifications for Demonstration Houses

Foundation

- RCC Column footing with grade beams using M-25 concrete
- Walling
- GFRG Panel filled with M20 concrete

Roof/Floor

- GFRG Panel Slab for floor& roof

Doors/Windows

- Aluminum Door & Window Frames
- Flush door Shutter
- PVC door and frames in toilet
- Glazed aluminum windows

Flooring & Finishing

- Ceramic tile flooring
- Interlocking pavers block at entrance lobby
- Oil bound distemper on internal surface
- Exterior walls with weather proof paint

Staircase

- GFRG Panel with polished cuddapa stone as tread and riser

Technologies / Specifications for Community Building

Foundation

- RCC Column footing with grade beams using M-25 concrete

Walling

- 200 mm thick walls using Fly ash blocks

Roof/Floor

- Filler slab using earthen pots / Mangalore tiles
- RCC Sloping roof over the courtyard and entrance lobby using Mangalore tiles as cladding



Shri M.Venkaiah Naidu, the then Hon’ble Minister of Housing & Urban Poverty Alleviation, Urban Development and Information & Broadcasting, inaugurating the the Demonstration Housing Project at Saraswathi Nagar, Venkatachalam Mandal, SPS Nellore District on September 3, 2016



Completed Demonstration Houses at Saraswathi Nagar, Venkatachalam Mandal, SPS Nellore District, Andhra Pradesh



Inside view of DUs of Demonstration Houses at Saraswathi Nagar, Venkatachalam Mandal, SPS Nellore District, Andhra Pradesh



Demonstration Community Building at Saraswathi Nagar, Venkatachalam Mandal, SPS Nellore District, Andhra Pradesh

Doors/Windows

- Aluminum Door & Window Frames
- Aluminum door shutter with pre laminated particle board
- PVC door and frames in toilet
- Glazed aluminum windows

Flooring & Finishing

- Vitrified tile flooring
- Ceramic tile flooring in Pantry and Toilets
- Interlocking pavers block in entrance lobby
- Oil bound distemper on internal plastered surface
- Exterior walls with water proofing cement paint

Infrastructure:

- Boundary wall of Fly-ash block Masonry
- Interlocking paver tiles on pathways and concrete internal roads
- Underground Water Tank
- Septic tank for solid waste management
- Landscaped inner court
- Rain Water Harvesting

The project has evinced interests amongst construction fraternity and the project has already been visited by number of professionals, entrepreneurs and developers.

(b) Demonstration Housing Project at Bhubaneswar, Odisha

Housing & Urban Development Department, Government of Odisha allotted 0.43 acres land for construction of Demonstration Houses with Expanded Polystyrene Core Panel System (EPS) Technology at Chandrashekharapur, Bhubaneshwar, Odisha.

Based on the discussion held with the officials of Bhubaneswar Development Authority (BDA), the plan, sections, layout plan of Demonstration Housing Project was finalised. The demonstration housing Project has one block having 32 DU in G+3 configuration. The carpet area of the unit is 23.97 sq.mt. having living room, cooking space, bed room, Bath and W.C. The built-up area of DU including area of common staircase is 34.10 sq.mt. and total built up area under the project is 11,782 sq.ft. The project also includes the on-site infrastructure work such as construction of pathways, boundary wall, water supply work, horticulture work, drainage & disposal and external electrification using solar panels etc.

The work upto second floor slab level has been completed and third floor is under progress. A sample house has also been completed with all facilities.

(c) Demonstration Housing Project at Bihar Shariff, Bihar

The Govt. of Bihar has designated Bihar Shariff Nagar Nigam as nodal agency for the demonstration project. The site for the demonstration project in Bihar Shariff has been identified and allotted for the purpose by local administration. BMTPC visited the site and based on the interaction & consultation with Bihar Shariff Nagar Nigam, the housing technology has been identified and building drawings have been finalized.

The demonstration houses comprising of 36 DUs (G+2) will be constructed using one of the emerging technology i.e. Monolithic Construction with Structural Stay-in-Place CR Steel Specially Designed Formwork System (Coffor). Each DU will comprise of multi-purpose room, a bed room, kitchen, separate w.c & bathroom. The carpet area of DU is 29.67 sq.mt. (319.25 sq.ft) and built-up area of DU including area of common staircase is 45.54 sq.mt. (490.0 sq. ft.). The infrastructure work will include internal road, pathways, boundary wall, septic tank, external electrification and water supply work, horticulture work, drainage & disposal, etc.

The project at Bihar Shariff, Bihar has already been initiated and excavation work is in progress.

(d) Demonstration Housing Project at Aurangabad Jagir, Lucknow

State Urban Development Agency (SUDA), Lucknow has identified 0.385 hectare of land at Aurangabad Jagir, Tehsil Sarojini Nagar, Lucknow for undertaking the Demonstration Housing Project. Based on the discussions held with the officials of SUDA, the Plan, Sections and Layout Plan of Demonstration Housing Project was prepared by BMTPC and was approved by SUDA. It has been planned to construct five blocks for 40 Demonstration Houses (G+1) having carpet area of 26.40 sq.mt. and built up area of each DU is 40.31 sq.mt. with emerging technology Stay in Place EPS based Double Walled Panel System (Sismo). The onsite infrastructure development work will include internal and external roads & pavements, Septic Tank, water supply, sewerage, external electrification, Drainage, Landscaping, Boundary Wall, Bore well, UGT, Transformer, etc.



Construction of Demonstration Housing Project at Bhubaneswar, Odisha



Shri Rajnath Singh, Hon'ble Union Home Minister, Govt. of India laying the Foundation Stone of Demonstration Housing Project at Lucknow, Uttar Pradesh through video conferencing on January 3, 2017

Shri Rajnath Singh, Hon'ble Union Home Minister, Govt. of India laid the Foundation Stone of Demonstration Housing Project at Lucknow, Uttar Pradesh through video conferencing on January 3, 2017.

The project has already been started and the construction of boundary wall and excavation work is in progress.

(e) Demonstration Housing Project at Hyderabad, Telangana

Telangana State Housing Corporation Limited (TSHCL), Hyderabad has identified 1085 sq.mts. of land at Nirmithi Kendra, Gachibowli, Hyderabad for undertaking the Demonstration Housing Project. After inspection, the proposed site was found suitable for construction of demonstration houses. Based on the discussions held with the officials of TSHCL the Plan, Sections and Layout Plan of Demonstration Housing Project was prepared by BMTPC and approved by TSHCL.

In order to demonstrate different emerging technologies, the Council has planned to construct two blocks for 32 Demonstration Houses (G+3) using two different technologies i.e (i) Monolithic construction with structural stay in place CR steel specially designed formwork system (16 houses) and (ii) Light Gauge Steel Framed Structure (16 houses). The DU will have carpet area of 38.74 and 39.50 sq.mts. and built up area of each DU is 53.18 and 53.10 sq.mts. Each DU will comprise of two bedrooms, multi-purpose room, kitchen, two WC & bathroom. The onsite infrastructure development like internal road, pathways, Septic tank, external electrification and water supply work, horticulture work, drainage & disposal, etc. are also part of the project.

The project has been initiated and excavation work is in progress.

Requests for Demonstration Housing Projects from other States

Besides, the site for three DHP's at Dehradun, Uttrakhand; Distt. Kanchipuram, Tamil Nadu and Guwahati, Assam has also been identified. The detailed project report of these project have been prepared and is under the consideration of CSMC of PMAY(U).

The BMTPC has also received the requests from state Govt. of Manipur, J&K, Kerala, Punjab and Jharkhand to undertake the

Demonstration Housing Projects in their states which will be taken up after the approval of CSMC of PMAY(U) – HFA Mission.

Partial funding support to selected Demonstration Housing Projects by National Housing Bank (NHB) and Department for International Development (DFID)

DFID and NHB is working on “Making affordable housing market work for faster & sustained economic growth” in eight identified low income States in India and one of the strategies is to test innovative technologies and approaches for Green construction. Under this strategy, NHB and DFID have become partners with BMTPC in demonstration housing projects being implemented in three States namely Odisha, Bihar & Uttar Pradesh and providing partial financial support.

Evaluation & Documentation of the four ongoing Demonstration housing projects on sustainable & green parameters

Four eminent Institutions namely School of Planning & Architecture, Delhi; IIT Roorkee; IIT Hyderabad and IIT Kanpur have been selected for evaluation and documentation of ongoing Demonstration Housing Projects being undertaken by BMTPC using emerging technologies at Bhubaneswar, Bihar Sharif, Hyderabad and Lucknow, respectively.

II. PRADHAN MANTRI AWAS YOJANA – HOUSING FOR ALL (URBAN) MISSION

1. BMTPC’s Role in Implementation of the Pradhan Mantri Awas Yojana – Housing for All (Urban) Mission

“Pradhan Mantri Awas Yojana (Urban) - Housing for All” Mission has been launched by Government of India. Ministry of Housing & Urban Affairs, Government of India has set up a Technology Sub-Mission under “Housing for All (Urban) Mission” with the objective of providing “Sustainable Technological Solutions for Faster & Cost Effective Construction of Houses suiting to Geo-Climatic and Hazard Conditions of the Country”.

The Technology Sub-Mission facilitates adoption of modern, innovative and green technologies and building material for faster and quality construction of houses. Technology Sub-Mission will also facilitate preparation and adoption of layout designs and building plans suitable for various geo-climatic zones. It will also assist States/Cities in deploying disaster resistant and environment

friendly technologies in collaboration with IITs/NITs/SPAs.

BMTPC is working as Secretariat of the Technology Sub-Mission with Executive Director, BMTPC as its Member Secretary.

Progress under the Technology Sub-Mission

- i) The Third Meeting of “Technology Sub-Mission under Housing for All” held on 29th April, 2016 to discuss the way forward for appropriate technical solutions and improvement in Design and Planning. A review meeting on Technology Sub-Mission was held on 27th October 2016.
- ii) So far, MoUs signed with 5 IITs (Roorkee, Chennai, Kharagpur, Kanpur and Hyderabad), 13 NITs (Silchar, Calicut, Utrakhand, Patna, Rourkela, Jalandhar, Itanagar, Surathkal, Surat, Jaipur, Hamirpur, Warangal and Nagpur) and 11 Architecture/Planning institutes (SPA Bhopal, SPA New Delhi, IEST Shibpur, JNAFAU Hyderabad, Jadavpur University Kolkata, CEPT University Ahmedabad, MNIT Jaipur, NIT Tiruchirapalli, NIT, Madhya Pradesh, IIT Roorkee and NIT Patna).The objective of the MoU is to facilitate interaction of these institutions with the states for technical support in the areas of identification & vetting of technologies, design, testing, quality assurance, monitoring, DPR preparation etc.
- iii) A review meeting of Technology Sub-Mission (TSM) was held on 5th January, 2017 discuss setting up Regional Hubs/ Technical Cells. The review meeting was meant basically for deciding the centres (IITs/NITs) for setting up of the six Regional Hubs under TSM, to know the progress of TSM till date and to discuss the proposal of TSM to be placed before CSMC of PMAY (U) Mission. The following IITs and NIT have been selected as centres for setting up Regional Hubs under TSM:

SI No.	Region	Institutes	States/UT to be covered
1	East	IIT Kharagpur	Bihar, Jharkhand, Odisha and West Bengal
2	North-Western	IIT Kanpur	Uttar Pradesh, Rajasthan, Maharashtra, Gujarat, Goa, Dadra & Nagar Haveli and Daman & Diu
3	North	IIT Roorkee	Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab and Uttarakhand

SI No.	Region	Institutes	States/UT to be covered
4	South	IIT Madras	Andhra Pradesh, Kerala, Karnataka, Lakshadweep, Puducherry, Tamil Nadu and Andaman & Nicobar Island
5	Central	IIT Hyderabad	Madhya Pradesh, Chhattis-garh and Telengana
6	North-East	NIT Silchar	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripuras and Sikkim

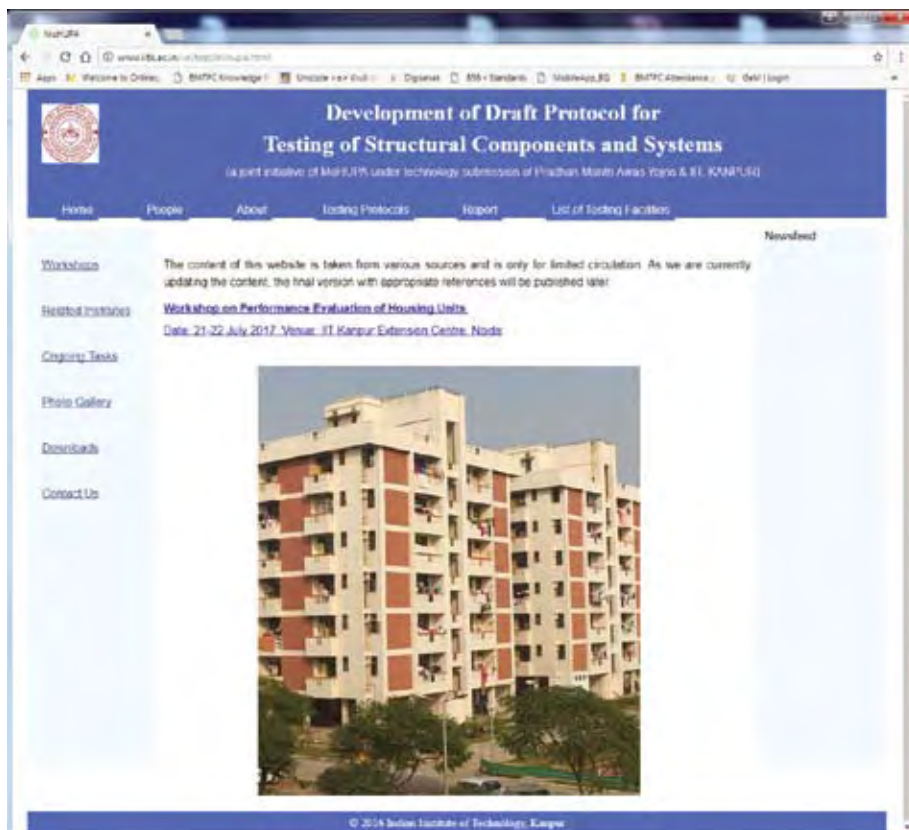
- iv) BMTPC organized Second Open House Discussion on the Technology Sub-Mission on 12th August, 2016 under the chairmanship of Joint Secretary (Housing). About 70 representatives from the states of Gujarat, Maharashtra, Chhattisgarh, West Bengal, Uttar Pradesh, Uttarakhand, Telangana & Kerala, architects, engineers from IITs/NIITs private consultants, professionals and faculties from School of Planning & Architecture (SPA), BEE and NSRC New Delhi participated in the discussion. Bureau of Energy Efficiency (BEE) has been involved for providing inputs on energy efficiency in housing. National Remote Sensing Center (NRSC), Hyderabad is also roped in for geo-tagging of houses and monitoring through satellite based system.
- v) Proposal from IIT Kanpur for “Developing a Protocol for testing of emerging technologies” was approved by CSMC in its second meeting with time frame of one year. Under the project development of testing methodologies for various tests to be conducted on building materials, its components including structural and functional performances were undertaken. This will help in assessing the suitability of various materials and construction systems for various geo-climatic zones. IIT Kanpur has already developed the draft protocol and created a dedicated web portal (<http://www.iitk.ac.in/ce/test/mihupa.html>) under this project.
- vi) Proposal from CBRI to develop comprehensive manual on EPS technology was approved by CSMC in its third meeting with time frame of 10 months. Under this project, the design guidelines, construction manual, quality control & quality assurance manual including specification and schedule of rates has been developed which will empower the construction agencies specially government to undertake projects using this new technology.
- vii) The Council is assisting the Ministry in interacting with

CPWD, Railways, Defence and Public Sector who can adopt new technologies for their employees and other housing projects and thereby catalyze the market. A presentation to MES officers from all over India was made by BMTPC on new technologies on 1st April, 2016.

- viii) Bhubaneswar Development Authority, Chattisgarh Housing Board, Govt. of Telangana and Govt of Gujarat have floated technology neutral tender. Govt. of Uttarakhand and Himachal Pradesh have approached BMTPC to assist them in adopting new technologies for mass housing. Kerala has recommended use of GFRG technology in their projects. BMTPC is hand holding DUSIB, Delhi for preparation of their tenders based on new technologies. BMTPC is also being approached by WAPCOS, NBCC, DDA and Ministry of Defence for identification of new housing technologies for their projects.
- ix) BMTPC is nominated as Nodal Agency for monitoring of project “Development of Modular, Infill and Interlocking AAC Blocks with its Design Interface for Market Driven Affordable Mass Housing for Low Income Group in India from IIT Roorkee” sanctioned under “Uchhatar Avishkar Yojana” of MoHRD.
- x) The Council has been designated as one of the agency for scrutiny of the projects received under Pradhan Mantri Awas Yojana (Urban) - Housing for All Mission for projects in various States/UTs falling in Earthquake Zone IV and Zone V. Scrutiny of DPR and site visit of the Beneficiary Led Construction Project of Dharamshala, Himachal Pradesh was undertaken by BMTPC.
- xi) The Council undertook handholding of various States on use of new emerging technologies and disaster resistance construction.
 - Discussion held with Daman & Diu UT officials on Disaster Resistant Construction and use of new technologies for houses being planned under PMAY. Also interacted with few beneficiaries who have been considered under Beneficiaries Led Construction Project.
 - Discussion held with Dadra & Nagar Haveli UT officials on Disaster Resistant Construction and use of new technologies for houses being planned under PMAY. Also interacted with few beneficiaries



Second Open House Discussion on the Technology Sub-Mission under Pradhan Mantri Awas Yojana (Urban) - Housing for All Mission held on August 12, 2016



“Protocol for Testing of Structural Components & Systems” developed by IIT Kanpur to help in assessing the suitability of various materials and construction systems (<http://www.iitk.ac.in/ce/test/mihupa.html>)

who have been considered under beneficiaries led construction project.

- Meeting with officials of Uttarakhand Govt. at Dehradun and made a presentation to Secretary (Housing) on adoption of New Technologies for Affordable Housing Projects in Uttarakhand.
- Meeting with SLNA officials of PMAY in Lucknow, Uttar Pradesh regarding adoption of New Technologies for construction of houses being planned under PMAY.

III. DISASTER MITIGATION - REPAIR, RECONSTRUCTION AND RETROFITTING

1. Earthquake Hazard Zoning Maps and Atlases

Looking at the recurrent earthquakes and associated risks in Indian context during recent years, the National Disaster Management Authority (NDMA), Government of India entrusted BMTPC the task of preparing updated earthquake hazard maps up to district level incorporating latest data.

Shri M.Venkaiah Naidu, the then Hon'ble Minister of Housing & Urban Poverty Alleviation, Urban Development and Information & Broadcasting, Government of India and Shri Rao Inderjit Singh, the then Hon'ble Minister of State for Urban Development and Housing & Urban Poverty Alleviation released the Earthquake Hazard Zoning Maps and Atlases on September 20, 2016 at New Delhi in the presence of NDMA, CPWD, DDA, NBCC, HUDCO and media.

The updated Earthquake Hazard Zoning Maps are based on Seismic zones as per IS 1893 (Part1) – 2002, District Boundary as per 2012 Survey of India data, Sub-division Boundary as per Census of India 2011 data, Epicentres of earthquakes of 4.0 and above as per IMD data, Seismo Tectonic details as per Seismotectonic Atlas of India of GSI. The additional features in the maps are Housing Data and Population data (Census 2011), Railway Lines, Golden Expressway & National Highway, Rivers & Waterbodies.

The updated Earthquake Hazard Maps and Atlases has the following components:

- Earthquake Hazard Zoning Maps for India
- Earthquake Hazard Zoning Maps for 36 States/UTs
- Earthquake Hazard Zoning Maps for all Districts
- Earthquake Hazard Zoning Atlas of India
- Earthquake Hazard Zoning Atlases for 36 States/UTs



Shri M.Venkaiah Naidu, the then Hon'ble Minister of Housing & Urban Poverty Alleviation, Urban Development and Information & Broadcasting, Government of India and Shri Rao Inderjit Singh, the then Hon'ble Minister of State for Urban Development and Housing & Urban Poverty Alleviation released the Earthquake Hazard Zoning Maps and Atlases brought out by NDMA and BMTPC on September 20, 2016 at New Delhi.



Usefulness of Earthquake Hazard Zoning Atlas and Maps

- All major stakeholder groups i.e. leaders and policy makers, urban planners, engineers and architects, disaster management professionals, and people at large will benefit from the earthquake hazard knowledge incorporated in the maps.
- These outputs will also be useful for Code Committees, architects and engineers, insurance agencies, people involved in land use planning, and, in various aspects of public and financial policies dealing with disaster mitigation and emergency planning and management.

2. Initiation of Development of Mobile App on Earthquake Hazard Zoning Maps and Atlases

Looking at the overall importance of seismic hazard in Indian context and associated risks involved, the National Disaster Management Authority (NDMA), Government of India entrusted BMTPC the task of preparing updated earthquake hazard maps upto district level. The NDMA-BMTPC Earthquake Hazard Maps and Atlases were released by the then Hon'ble Minister of HUPA on September 20, 2016. While releasing, Hon'ble Minister had desired that a Mobile App of the Earthquake Hazard Zoning Maps may be developed so that these can be used by masses.

BMTPC has initiated development of the Mobile App on "Earthquake Hazard Map of India". The Mobile App will be available on the Google Play Store and Apple App Store for android and iOS users respectively. As a part of Digital India programme of Government of India, the Mobile App will be helpful in providing necessary information with regard to earthquake zonation of the country to the professionals in particular and masses in general. The Mobile App for android have been developed and the testing of the module is in progress. After the development of android module, iOS module will be developed.

3. Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings : IS 1893 vs. Euro Code 8

BMTPC has always been imparting quality education and creating mass awareness amongst common men and professionals through training courses, symposia, conferences and publishing manuals, guidelines, brochures, etc. on disaster resistant design and construction including safe construction practices in collaboration with various technical and academic institutions.



Dr. Nandita Chatterjee, the then Secretary, Ministry of Housing & Urban Poverty Alleviation, Government of India addressing the Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8 organised from December 8-10, 2016



Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8 organised from December 8-10, 2016

Since 2006, BMTPC has been organizing Training Courses jointly with IIT Roorkee on regular basis. IIT Roorkee is one of the premier organization having excelled in the area of earthquake resistant design and construction and one of the first School of Earthquake Engineering in India.

In the series, a three-days Indo-Norwegian Training Programme on “Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8” was organized by BMTPC jointly with Indian Institute of Technology, Roorkee (IIT Roorkee) and NORSAR, Norway at New Delhi from December 8–10, 2016. NORSAR has been roped in by IIT Roorkee for providing faculty for the course. The programme was attended by around 60 participants from various parts of the country including Nepal and Bhutan. The programme was inaugurated by Dr. Nandita Chatterjee, the then Secretary, Ministry of Housing & Urban Poverty Alleviation. The course was specifically targeted for Structural, Geotechnical Engineers and Designers in public and private sectors with emphasis on real-life problems and tackling them through hands-on training.

4. Revision of Vulnerability Atlas of India

The Council brought out the first ever Vulnerability Atlas of India in 1997 comprising of hazard maps w.r.t. earthquakes, wind/cyclones and floods and district wise vulnerability/risk tables of housing stock based on the types of materials as per census 1991 data. The second edition of the Vulnerability Atlas of India was brought out in 2006. The Vulnerability Atlas of India is often referred and used by disaster management authority of State and Central for disaster management and planning.

The Vulnerability Atlas of India, which contains hazard maps of earthquakes, cyclones and flood and district wise tables of vulnerability of houses, based on the types of walling and roofing as per Census data, is being revised to incorporate latest information regarding existing earthquake zoning map, wind zoning map and flood zoning map and housing statistics as per Census 2011 data. The Peer Group, set up by the Ministry, has also decided to incorporate landslide Incidence Map of India and information about Thunder Storm.

Interaction with India Meteorological Department, New Delhi; Central Water Commission, New Delhi; Bureau of Indian Standards, New Delhi; Structural Engineering Research Centre, Chennai; National Remote Sensing Centre, Hyderabad and Geological Survey of India, Kolkata were held to collect necessary data regarding

cyclone, storm surge, earthquakes, seismic & wind zoning, flood prone areas & landslides incidences.

While latest data regarding flood prone areas are not available as yet from CWC, based on other data; earthquake hazard maps of India & States, Cyclone Hazard Maps of India & States, all India Map for Thunder Storm surge has been prepared. For data regarding landslides, meetings were held with GSI, National Disaster Management Authority and National Institute of Disaster Management. The data from GSI, which were in report form, is being converted into 'Excel' sheet and based on that landslide Incidence Map of India will be developed. Work on the Districtwise Risk tables based on Latest Census data, also initiated.

5. Publication of Handbook for Urban Managers on Disaster Risk Reduction

Under the guidance of the Ministry of Housing & Urban Affairs, BMTPC in association with UNDP has brought out 'Disaster Risk Reduction : A Handbook for Urban Managers'. The objective of this handbook is to help Municipal Commissioners and other policy makers understand the risk concept of sensitive planning and ensuring safety against disasters through appropriate implementation of disaster mitigation measures. Case studies have also been included to cite the good practices undertaken in risk sensitive urban planning. The Handbook has been circulated to all States/UTs.

IV. ACTIVITIES IN NORTH-EASTERN REGION

1. Significant Activities in North-Eastern Region

BMTPC is actively involved in developing and promoting bamboo based technologies in the North-Eastern Region and other bamboo growing areas. The major activities encompasses setting up of Bamboo Mat Production Centres for processing of bamboo, encouraging commercial production of bamboo based products, and construction of demonstration houses/structures. The Council is constantly imparting training to the local artisans as regards use of bamboo in building construction.

- Conducted Training Programme on "Bamboo based Toilet Building" at Imphal, Manipur from 13th to 17th May, 2016 in association with Manipur State Bamboo Mission, Govt. of Manipur, South Asia Bamboo Foundation and Inter Agency Group, Manipur. The training programme was attended by

20 participants from IAG-Manipur member organization namely DSS, Dynamic Manipur, CASA, RNBA, Social Warriors Manipur, WSDC, IRMA and SESU. The 5 days long programme had both theoretical and practical session on understanding bamboo as building material of houses, toilets and wall fencing. During the training two types of toilet modules were also constructed using local bamboo. The models are single toilet for household usages and twin model for community usages like schools and other public places.

- Organised Training Programme on “Bamboo based Toilet Building” at Kaziranga National Park, Golaghat district, Assam from 7th to 17th Oct.2016 jointly with South Asia Bamboo Foundation. The main objectives of the training were to create awareness about Bamboo and its importance for sustainable development, to create trained human resources in the field of bamboo construction, to provide exposure to the trainees on the practical applications and the various techniques of the construction involved and promotion of bamboo entrepreneurs throughout the region. The methodology of this training programme included both “Theory and Practical Demonstration” covering all the techniques involving basic construction process, learning techniques for selecting a bamboo for the construction harvesting and preservative techniques, learning joinery of bamboo etc. The training programme was attended by 25 participants from the local community. One block of Bamboo Toilet for tourist was also built by the trainees during the workshop which is fully functional and is used by the tourist on “pay& use” Basis.

- Another Training Workshop on “Building with Bamboo” was conducted from 25th to 28th March 2017 at Guwahati in association with State Government. The main objective of the training programme was to provide technical know-how on the use of the bamboo technology as a whole and particularly in the housing sector as well as in varied structural applications. The programme was attended by 75 participants consisting of Architects, Civil Engineers Builders, consultants, Entrepreneurs, NGOs etc.



Construction of Toilet during Training Programme on “Bamboo based Toilet Building” at Imphal, Manipur from May 13-17, 2016



Training Workshop on “Building with Bamboo” organised from March 25-28, 2017 at Guwahati

V. STRENGTHENING THE INFORMATION AND DATABASE IN THE CONSTRUCTION SECTOR

1. Publication of the “Nirman Sarika” – Special Issue of BMTPC Newsletter

The then Ministry of Housing & Urban Poverty Alleviation celebrated the World Habitat Day on 3rd October, 2016 at New Delhi. To mark the occasion, BMTPC brought out a Special Issue of its Newsletter “Nirman Sarika” on the theme “Housing at the Centre”, chosen by United Nations. This special publication focused on the various issues related to the theme of the World Habitat Day besides highlighting the activities of the Council. The “Nirman Sarika” was released by the then Minister of Housing and Urban Poverty Alleviation, Shri M. Venkaiah Naidu along with the then Hon’ble Minister of State of Housing and Urban Poverty Alleviation, Rao Inderjit Singh during the celebration ceremony of World Habitat Day 2016 held on October 3, 2016 at New Delhi.

2. Publication of “Guidebook on Earthquake Resistant Design and Construction”

BMTPC in its endeavour to have earthquake resilient India has been in forefront and brings out simple to comprehend guidelines, manuals, illustrations which can help not only professionals as well as common people so as to understand the complexities of earthquake resistant design & construction. Taking this forward, BMTPC joined hands with Department of Earthquake Engineering (erstwhile School of Earthquake Engineering), IIT Roorkee to prepare the “Guidebook on Earthquake Resistant Design and Construction” which in common parlance through diagrammatic representations explains the earthquake design & construction principles keeping in mind the common man.

The purpose of preparation of the guidebook is that a common man who has no idea/exposure to earthquake engineering can make his house seismically safe. However, it is very difficult to entirely eliminate all the intricacies of earthquake engineering and present the matter in a fashion understandable to all. An attempt has been made so that the owner of a house/building can ensure the safety of his house from the earthquake point of view. The manual has three sections and covers all aspects of earthquake engineering ranging from non-engineered construction to RCC, multistoried buildings, thumb rules to classical design & construction principles and also seismic evaluation and retrofit.

This guidebook not only cover the details of earthquake safe construction but also provide direction to evaluate the seismic

capacity and vulnerabilities of a house/building for future earthquake. If the house/building is found seismically deficient, a number of techniques have been suggested to increase/upgrade their seismic capacity for the future earthquake. These techniques are called retrofitting measures. The guidebook also suggests measures to repair and retrofit an earthquake damaged house/building. In short, the guidebook has covered all the details to make earthquake safe construction (new or existing) of a house or multi-story reinforced concrete buildings.

The publication was released by Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, the then Hon'ble Minister of State of Housing and Urban Poverty Alleviation during the celebration ceremony of World Habitat Day 2016 held on October 3, 2016 at New Delhi.

3. Publication of Pocket book on Emerging Construction Systems

BMTPC has been promoting alternate cost-effective, environment-friendly, energy-efficient and disaster resistant technologies. Recently, BMTPC took an initiative to study/select emerging and alternate cost effective technologies suitable to Indian geo-climatic conditions and advocate these technologies to the State Govt. for implementation in housing projects under various housing schemes of government in different parts of the country.

In order to mainstream the new emerging technologies, BMTPC have brought out the Pocket Book on Emerging Construction Systems with a view to sensitize professionals including common man. The Pocket Book presents general information on the technologies in pictorial form.

The publication was released by Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, the then Hon'ble Minister of State of Housing and Urban Poverty Alleviation during the celebration ceremony of World Habitat Day 2016 held on October 3, 2016 at New Delhi.

4. Publication of “Margdarshika for Masons – Rajmistry ke liye Dishanirdesh”

Capacity building and nation building go hand in hand. Nation cannot progress without human power. Today, in our country, building and housing technologies has progressed fast, especially during the last few decades. But the capacity building and skill development could not keep pace with it. It is visible during the life time of our buildings, especially when the natural disaster struck. This not only

involves inappropriate hardship to the occupants and owners of these buildings, but as a result, there is a waste of rare resources of our country which can otherwise be used for development.

The root cause of the poor performance of buildings is low level of skill and technical knowledge in the millions of artisans working on different aspects of traditional construction. Except rare exceptions, none of them have received formal training or formal recognition. An artisan is trained in pieces on the site from those people who have insufficient information on their own. Unfortunately, today, artisans rarely get the opportunity to interact with engineers, and many construction contractors do not even have enough technical information.

Therefore, today's demand is to build the skills and knowledge of these artisans to the desired level, so that they do well, and when they teach other upcoming semi-skilled people on the site, then they teach the right skills and give accurate information. It is also important that the artisans be recognized by certification, which indicates their level of expertise. It requires a certification system which is suited to these working craftsmen, who can provide a ladder to move forward and contribute to nation building. BMTPC has evolved a building artisan certification system.

Based on the certification system, this guidebook, in Hindi, has been prepared for masons engaged in the building construction work. According to the course of this certification, the information needed to create a safe, strong and accurate structure from bricks, stones and concrete blocks for the construction of buildings of good quality and durable masonry has been included in this guidebook.

This guidebook provides guidance to masons for preparing for the evaluation of Mason's Certificate. It also provides information to those training organizations which will help in maximizing the skills and technical information needed in the evaluation of certification of masons.

The publication was released by Shri M. Venkaiah Naidu, the then Hon'ble Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, the then Hon'ble Minister of State of Housing and Urban Poverty Alleviation during the celebration ceremony of World Habitat Day 2016 held on October 3, 2016 at New Delhi.

5. Information Dissemination through Website of the Council

The Website of the Council (www.bmtpc.org) is being visited by

professionals and others globally. It is being used as a reference resource in the area of innovative building materials and construction technologies. The website of the Council acts as a repository on alternate building materials and construction in line with its mandate to create enabling environment of affordable housing for all. The Council's website has also been developed in Hindi (hindi.bmtpc.org) as per the directions of the Rajbhasha Nideshalaya.

There is good response on website in the form of general enquiry about product and services. The website of the Council is regularly updated with latest technical information besides hire and purchase requirements, tender notices, training programmes, Right to Information Act and others as required from time to time.

6. Standardization and Product Evaluation

Performance Appraisal Certification Scheme (PACS)

Performance Appraisal Certification Scheme (PACS), being operated by BMTPC, is a third party voluntary scheme for providing Performance Appraisal Certificate (PAC) to manufacturers or installers of a product which includes building materials, products, components, elements and systems etc. after due process of assessment.

Since the Scheme is operated for the products/systems where no relevant Indian Standards are available, it is required to first work out the desired specifications for Performance Appraisal. For the items where no Indian codes are available, international practices are also being referred. In few cases the specifications recommended by the manufacturers have to be modified based on global practices to improve the quality and performance.

Various states, their Housing Boards and other departments are also promoting and using emerging technologies and materials for construction of mass housing in their states. As such PACS has become an important tool for introduction of emerging technologies in mass housing and Model Demonstration houses have been constructed at one location while at three locations these are under progress in using some of these emerging technologies.

Approval of PACs

Technical Assessment Committee (TAC) constituted for the purpose of approval of Performance Appraisal Certificate (PAC) in its 11th meeting held on 28th December, 2016 has approved issue of PACs

for the following new products/systems:

- i) Concrewall System
- ii) Insulating Concrete Forms
- iii) Prefabricated Fibre Reinforced Sandwich Panels

However, a total of 7 PACs were issued in 2016-17 as 4 PACs approved in 10th TAC Meeting held on 10th March, 2016 were also issued in 2016-17.

Approval of Renewal of PACs

Technical Assessment Committee (TAC) in its 11th meeting held on 28th December, 2016 has approved renewal of PACs for the following products/systems:

- i) Glass Fibre Reinforced Gypsum Panel System (GFRG) manufactured by M/s FACT-RCF Building Products Ltd., Kochi
- ii) Bamboowood Flooring manufactured by M/s Mutha Industries Ltd., Agartala (Tripura)
- iii) QuikBuild 3D Panels manufactured by M/s Beardsell Ltd., Chennai
- iv) Modular Tunnelform manufactured by M/s Outinord Formworks Pvt. Ltd., Pune/France

However, a total of 9 PACs were renewed in 2016-17 as 5 PACs approved in 10th TAC Meeting were also renewed in 2016-17.

Inspection of Works

Inspection of Works of the following new products/systems has been carried out by the officers of BMTPC and TAC members:

- i) Insulating Concrete Forms on 25th May, 2016
- ii) Easywalls Hollowcore Concrete Wall Panels on 13th October, 2016
- iii) Prefabricated Fibre Reinforced Sandwich Panels on 7th & 8th November, 2016

Surveillance Inspection of Works

Surveillance Inspection of Works of the following products/systems for renewal of the PACs has been carried out by the officers of BMTPC:

- i) Bamboowood Flooring on 26th & 27th May, 2016



Inspection of Works of Prefabricated Fibre Reinforced Sandwich Panels of Hyderabad Industries Ltd., Hyderabad carried out by the BMTPC alongwith TAC members on November 7-8, 2016 under PACS



- ii) QuikBuild 3D Panels 16th & 17th June, 2016
- iii) Glass Fibre Reinforced Gypsum Panel System on 7th October, 2016
- iv) Speed Floor on 27th January, 2017
- v) Marshal Doors, Plastocrete Panels, Insulated Roof Panels, Underground Storage Tanks and Formwork for Monolithic Concrete Construction on 21st & 22nd March, 2017
- vi) Walltec Hollowcore Concrete Wall Panels on 23rd March, 2017
- vii) Soundproof Drainage Piping System on 24th March, 2017

Applications under process for issuance of PACs

Applications received for issue of PACs are in the pipe line as per the details given below:

- i) Rising EPS Cement Panels of M/s Rising Japan Infra Pvt. Ltd., New Delhi
- ii) Plastic Honeycomb Panels of M/s Anjani Technoplast Ltd, Greater Noida
- iii) Stay- in-Place Formwork System of M/s Coffor Construction Technology India, Vadodra (Gujarat)
- iv) GCI Wall Forms Inc., U.S.A
- v) Easywalls Hollowcore Concrete Wall Panels of M/s Mahesh Prefab Pvt. Ltd., Gurgaon (Haryana)
- vi) RCCPrefab Universal Building System of RCCPrefab Pvt. Ltd., New Delhi

Technical Inputs to Sectional Committees of BIS

Apart from PACS, the Council is providing technical inputs to various Sectional Committees of Bureau of Indian Standards for formulation of Indian Standards on various subjects related to Civil Engineering such as Cement and Concrete; Flooring, Wall Furnishing and Roofing Materials; Earthquake Engineering; Housing Prefabricated Construction; Hill Area Development; National Building Code; etc.

Inclusion of Emerging Technologies in the National Building Code (NBC) 2016

Under the guidance of Ministry of Housing & Urban Affairs, Bureau of Indian Standards (BIS) was persuaded for inclusion of new/ alternative building technologies, as identified and evaluated by BMTPC for covering in relevant Indian Standards and National Building Code (NBC). After detailed deliberations with BMTPC and due consultation with their concerned experts, BIS has included the

emerging technologies in the recently published National Building Code (NBC) 2016.

Inclusion of Emerging Technologies in the DSR and SOR of CPWD

The then Ministry of Urban Development has directed CPWD, DDA & NBCC to adopt three new technologies which have been validated by BMTPC for their projects initially in Metropolitan cities of India and where the value of works is Rs. 100 crores or more. These technologies are: Monolithic Concrete Construction system using Aluminium Formwork, Industrialized 3-S system using Cellular Light Weight Concrete Slabs and Precast Columns and Monolithic Concrete Construction system using Plastic- Aluminium Formwork. Now the Ministry of Urban Development vide circular dated December 28, 2016 has notified that these new technologies may be mandatorily adopted for all projects across the country irrespective of location and project cost w.e.f.1.4.2017. CPWD has also introduced turnkey project item rate with scope and payment schedule on these three technologies in DSR 2016.

With the efforts of the Council, CPWD has prepared SOR and included in Delhi Schedule of Rates for three technologies namely, Monolithic Concrete Construction, EPS Core Panel System and Light Gauge Framed Structure. Also a letter has been written to CPWD requesting inclusion of SOR in their DSR on GFRG Panel System which was prepared by BMTPC.

VI. PROMOTIONAL AND CAPACITY BUILDING ACTIVITIES AT NATIONAL AND INTERNATIONAL LEVEL

1. Organization of National Seminar on Emerging Building Materials and Construction Technologies at New Delhi

The Council organized a National Seminar on Emerging Building Materials and Construction Technologies on November, 18, 2016 at New Delhi to bring Engineers, Architects, Technology Providers, Plant and Machine Manufacturers, Users, Govt. Agencies and other stake holders; looking for emerging building materials and technologies and construction practices on one platform to take stock of new developments in this area.

The National Seminar was inaugurated by Dr. N.Chatterjee, the then Secretary, MoHUPA. Around 65 participants including representatives from govt. agencies, Academic, R&D Institutions,



Dr. Nandita Chatterjee, the then Secretary, MoHUPA inaugurating the National Seminar on Emerging Building Materials and Construction Technologies organised at New Delhi on November, 18, 2016



known experts of the country; agencies involved in bringing technologies from advanced countries also participated in the workshop.

The Council had planned the whole seminar under various sub-themes to have detailed discussions and each session was addressed by the eminent key experts working in that area for the benefit of participants during the seminar.

2. Organization of National Workshop on “Utilization of Construction & Demolition (C&D) Waste in Construction of Dwelling Units & Related Infrastructures at New Delhi

BMTPC has prepared the Guidelines for Utilization of Construction & Demolition (C&D) Waste in Construction of Dwelling Units & related Infrastructures in association with C-FARM, New Delhi. Utilization of Construction and Demolition waste in construction activities is a burning topic. Recently Ministry of Environment Forest and Climatic Change, Govt. of India has brought out C&D Waste Management Rule 2016 defining the waste, duties of waste generator, duties of local authorities, service providers and Pollution Control Boards, criteria for site selection for storage and processing or recycling facilities for construction and demolition waste etc.

In many industrialized countries, C&D waste is being recycled and used for housing and infrastructure. In India also, some of the state governments have taken steps to process and use C&D waste in construction. In Delhi and Gujarat, plants have been set up to process the C&D waste for its gainful utilization. It is required to set up such facilities in other parts of the country also.

The Guidelines covers International Scenario of use of C&D waste, Indian Scenario of availability & generation of C&D waste, potential of use of C&D waste in building sector with suggestion for specific uses and a Road Map for Gainful utilization of C&D waste in housing sector.

In order to sensitize and create awareness about the important points of the Guidelines amongst different stakeholders, a National Workshop was organised on September 23, 2016 at New Delhi. The Workshop was inaugurated by Dr. N.Chatterjee, the then Secretary, Ministry of Housing & Urban Poverty Alleviation.

About 150 delegates from Municipal Corporation, Pollution Control Board, Technical Institution, Construction Industry and C&D waste Processors & Equipment Suppliers participated in the workshop.



National Workshop on “Utilization of Construction & Demolition (C&D) Waste in Construction of Dwelling Units & Related Infrastructures” organised at New Delhi on September 23, 2016



Consultation on “Shallow Masonry Domes - Alternative Traditions in Roofing Systems” organised at New Delhi on July 21, 2016

3. Organization of Consultation on “Shallow Masonry Domes- Alternative Traditions in Roofing Systems” at New Delhi

BMTPC jointly with Hunnarshala Foundation organized a Consultation on “Shallow Masonry Domes - Alternative Traditions in Roofing Systems”, a day-long workshop on July 21, 2016 at New Delhi with the support of Development Alternatives.

The consultation workshop was about the traditional practice of Shallow Masonry Domes, or ‘daant ki chhat’ as they are colloquially called in Haryana and UP. Masons in the region have experimented with form and process of dome making. They’ve incorporated new technologies and innovation into the age-old art to make domes that are shallow enough to allow flat top surfaces.

These shallow domes have several advantages:

- Carbon footprint is lower compared to RCC roofs, as it uses burnt bricks/fly ash bricks/stabilized mud bricks, mortar & little reinforcement at supports only
- Suitable for individual house construction
- It allows vertical incrementability due to its shallow depth at supports

In the workshop, the history & context, the structural performance & contemporary practices were deliberated by eminent experts. The main aim of this consultation was to bring together the larger community of construction practitioners, including engineers, architects, academics and artisans to unlock the potential of this tradition of building shallow masonry dome roofs.

A large community of construction practitioners, including engineers, architects, academics and artisans participated in the deliberation and had assessment of the roofing system.

The workshop was inaugurated by the then Joint Secretary (Housing), M/o HUPA, GoI. More than 100 participants including faculties of planning & architecture, practicing architects, engineers, representatives from NGOs working in the field of sustainability & environment, artisans involved in the construction of domes, students of architecture took part in workshop deliberations.

4. Capacity Building Programmes

Capacity building and skill development is one of the core activities of BMTPC. BMTPC has planned to organize capacity building programmes in various States to enhance the capacity of engineers & architects. With the emergence of new building materials, advancement of technologies and the need for disaster resistant construction to mitigate the effect of natural disasters, it is important that working professionals regularly update their knowledge and understanding. Realising this need of capacity building of professionals, BMTPC has continued its efforts in organizing structured programmes on subjects related to advancement in the area of building materials for working professionals on regular basis.

Brief on the Training Programme organized during the year are as follows:

- Conducted a State Level sensitization programme in Dehradun, Uttarakhand on “Good Construction Practices and multi hazard resistant construction” in Dehradun, Uttarakhand on September 27, 2016. About 30-40 architects, engineers from various departments participated in the programme.
- Organised Training Programme for Engineers on “Earthquake Resistant constructions jointly with Aizawl Municipal Corporation and Geo-Hazards International from October 17-19, 2016 at Aizawl, Mizoram. The training programme mainly focus on the basics, the codal provision and the problems associated with hill sides construction and the aspects to be taken care of during design & construction of hill side buildings. A visit to site of construction of few buildings were also made, followed by the discussion with Engineers on the vulnerability of the buildings and construction. About 35 engineers from Aizawl Municipal Corporation, State PWD Engineers, Engineers from Public health engineering department etc. were provided training.
- “Training on Good Engineering Practices including Disaster resistant aspects in Construction” were imparted to ULB/ State engineers & construction professionals from North Eastern areas (prone to earthquakes and landslides) & UTs during the Regional Workshop & Experience sharing

on Pradhan Mantri Awas Yojana PMAY-HFA (Urban) for North Eastern States & UTs held on 20-21 January, 2017 at Agartala, Tripura. Hands-on Training Programme for Masons on “Good Construction Practices include Disaster Resistant Construction” was also conducted on January 20, 2017 alongside the Workshop wherein 44 masons from 3 ULBs of Tripura were imparted training.

- Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing was organised at Gandhinagar, Gujarat on February 9, 2017. The purpose of this programme was to introduce Emerging Technologies for construction of houses which may be useful for mass housing projects in the state and also to sensitize the engineers & architects at ULB & State level in the area of Good Construction Practices for housing projects.
- Sensitization Programme on Quality and Disaster-resistant aspects was conducted in Bihar Sharif, Bihar on 13 February 2017, for the beneficiaries engaged in construction of their houses sanctioned under Housing for All. The masons involved in the construction and supervising engineers participated in the programme, making total participants as 80. The training comprises of lectures in forenoon session & practical aspects in the second half at one of the selected beneficiary’s housing site. Some under construction houses were also visited prior to lectures. The deficiencies observed there, reasons for those deficiencies, possible measures to rectify and preventive measures were explained during the lecture. The Mayor of Bihar Sharif Nagar Nigam also addressed the gathering.
- Organized one-day sensitization Programme on “Good Construction Practices and Emerging Technologies” for mass housing at Port Blair, Andaman & Nicobar Islands on February 23, 2017. The purpose of this programme was to introduce Emerging Technologies for construction of houses to the State/UT officials which are useful for mass housing projects and also to sensitize the engineers & architects at ULB & State level in the area of Good Construction Practices for housing projects. The programme was attended by engineers, architects and other officials.



Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing organised at Dehradun, Uttarakhand on September 27, 2016



Release of Earthquake Hazard Zoning Map of Uttarakhand during Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing organised at Dehradun, Uttarakhand on September 27, 2016



“Training on Good Engineering Practices including Disaster resistant aspects in Construction” were imparted to ULB/State engineers & construction professionals from North Eastern areas during the Regional Workshop on PMAY (Urban) on 20-21 January, 2017 at Agartala, Tripura.



Hands-on Training Programme for Masons on “Good Construction Practices include Disaster Resistant Construction” conducted on January 20, 2017 alongside the PMAY(U) Workshop.



Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing organised at Gandhinagar, Gujarat on February 9, 2017



5. World Habitat Day 2016 Celebrations

On the occasion of World Habitat Day 2016, the Council conducted the following activities:

Painting Competition for Differently Abled Children

As a part of the World Habitat Day Celebrations, BMTPC organised Painting Competition for Differently Abled Children on the theme “Housing at the Centre” in the categories viz. (i) Mentally Challenged, (ii) Hearing Impaired and (iii) Visually Impaired children.

In invited 32 schools, 12 schools have taken part in the Painting Competition. From the 147 selected entries sent by the respective Schools, the Jury in BMTPC selected the best entries for prizes.

The prizes were awarded to winning entries by Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, Minister of State of Housing and Urban Poverty Alleviation during the celebration ceremony of World Habitat Day 2016 held on October 3, 2016 at New Delhi.

Release of Publications

To mark the occasion, following publications were brought out by BMTPC:

- (i) Special Issue of Newsletter “Nirman Sarika” on the theme of the World Habitat Day “Housing at the Centre”,
- (ii) Guidebook on Earthquake Resistant Design and Construction,
- (iii) Margdarshika for Masons – Rajmistry ke liye Dishanirdesh, and
- (iv) Pocket book on Emerging Construction Systems

These publications were released by Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation during the World Habitat Day function.

6. Participation in India International Trade Fair, 2016, Pragati Maidan, New Delhi from 14-27 November 2016

BMTPC participated in the HUDCO BuildTech 2016 during the India International Trade Fair, Pragati Maidan, New Delhi by putting up exhibition on Alternate & Emerging Building Materials and Technologies. Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation & President, Board of Management, BMTPC, inaugurated BMTPC Display. Besides displaying emerging technologies, models of emerging building



Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, the then Hon'ble Minister of State of Housing and Urban Poverty Alleviation releasing the publications of BMTPC during the World Habitat Day on October 3, 2016 at New Delhi





Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with other dignitaries giving away the Prizes to the winners of Painting Competition of Differently Abled Children organised by BMTPC during the World Habitat Day on October 3, 2016 at New Delhi



Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation along with Rao Inderjit Singh, the then Hon'ble Minister of State of Housing and Urban Poverty Alleviation visiting the exhibition of Paintings during the World Habitat Day on October 3, 2016 at New Delhi



Shri M. Venkaiah Naidu, the then Minister of Housing and Urban Poverty Alleviation at BMTPC Display during the India International Trade Fair, 2016 at Pragati Maidan, New Delhi



materials and construction technologies were displayed for the benefit of the common public. BMTPC Display attracted large number of professional, VIPs, foreign delegation and general public which evinced interest in the various innovative building materials and technologies being promoted by the Council.

VII. TECHNOLOGY DEVELOPMENT, DIFFUSION AND TRANSFER

1. Identification and Evaluation of Emerging Housing Technologies

The Council has been studying best-construction practices adopted world over to identify, evaluate and promote suitable technologies suiting Indian geo-climatic conditions on regular basis. In the process, during the year, following technologies were identified, which have potential to be used for mass housing in the country:

QuikBuild 3D Panels

QuikBuild panel system consists of a welded wire space frame integrated with a polystyrene insulation core. The wall panel is placed in position and a wythe of concrete is applied to both sides. The wall panel receives its strength and rigidity from the diagonal cross wires welded to the welded-wire fabric on each side. This combination produces a truss behavior, which provides rigidity and shear terms for a full composite behavior. Steel trusses are pierced through the polystyrene core and welded to the outer layer sheets of galvanized steel mesh to form a rigid panel. The shell of the structure is built by manually erecting the panels directly onto the slab with reinforcement rods. Desired utilities like doors, windows and ventilators may be pre-built while plumbing, electrical conduits may be added onsite.

The wall is then finished by plastering with cement using the traditional method or by shotcreting machine to create a monolithic structure. These panels are used in the construction of exterior and interior load-bearing and non-load bearing walls and floors of buildings of all types of construction.

Concrewall System

The Concrewall System is an industrial system for the construction of structural walls of reinforced concrete for building in single panel up to G+3.

The system is composed of a factory produced panel of undulated (wave shape) polystyrene covered on both sides by an electro-

welded zinc coated square mesh of galvanized steel and linked by 40 connectors per sq m made of high-elastic-limit 3mm dia wires realizing a 3 dimensional hyper-static reinforced steel.

The panels are assembled on site and in-situ concrete (double panels, floors, stairs) and shotcreted concrete sprayed (single panel) to realize the following different elements of the system:

- Vertical structural walls
- Horizontal structural elements
- Cladding element
- Internal walls.

Insulating Concrete Forms

Insulating concrete Forms (ICF) System comprises of a panel of two walls of Expandable Polystyrene (EPS) separated by a nominal distance of 150 mm by hard plastic ties. These are assembled on site to hold reinforced concrete. The forms are open ended hollow polystyrene blocks which fit tightly together to form a shuttering system. Concrete poured into the hollow space to form a continuous wall. When cured, this wall supports the structural loads from floors and roofs, and the shuttering provides thermal insulation. Reinforcing steel shall be as required from design.

Upper and lower surfaces of the polystyrene panels are castellated and the vertical mating surfaces are tongue-and-groove to form a tight fit when joined together. The rigid formwork does not require supporting falsework. The inner surfaces have tapered grooves running vertically and have offset on opposite faces to ensure uniform concrete thickness. They also form locks for end stops. The outer surfaces are grooved vertically at 50mm centres to aid cutting and trimming.

Rising EPS (Beads) Cement Panels

Rising EPS (Beads) Cement Panels are lightweight composite wall, floor and roof sandwich panels made of thin fiber cement/calcium silicate board as face covered boards and the core material is EPS granule balls, adhesive, cement, sand, fly ash and other bonding materials in mortar form.

The core material in slurry state is pushed under pressure into preset molds. Once set, it shall be moved for curing and ready for use with RCC or steel support structure beams and pillars. These panels are primarily used as walling material but can also be used as floor and roof panels. These are non-load bearing panels to be used with structural support frame only.

Prefabricated Fibre Reinforced Sandwich Panels

Prefabricated Fibre Reinforced Sandwich Panels are sandwich panels, made of two fibre reinforced cement facing sheets, on either sides of a lightweight concrete core. The core is made from a mix of portland cement, binders and siliceous & micaceous material aggregate. These panels have a unique tongue and groove jointing system that facilitates rapid construction and are fully cured at the factory itself. These panels are manufactured by using Flexo Board (FOB)/ Fibre Cement Board (NT).

Structural Stay-in-Place Formwork System

The formwork consists of two panels with vertical stiffening framework of press-formed steel sheet sections and skin of an expanded metal, connected to each other by metal connectors. The panels are made of rib lath & C shaped profiles made of galvanized sheets and articulated rebar loops. The system consists of an integrated formwork with draining facing panels, self-bracing with relation to the thrust from the fresh concrete. Due to its implementation, the system makes it possible to build vertical walls, straight or curved, bearing or non-bearing, outside or inside walls.

The technology was originally developed by Coffor Services S. A., Switzerland and the firm has a collaboration with Coffor France SNC, France.

2. Preparation of Compendium of Prospective Emerging Technologies for Mass Housing

As an ongoing activity, the Council has so far under PACS certified 16 new construction systems covering monolithic concrete construction system, prefabricated concrete construction, EPS based Panel System. Being regular activity intensive efforts are being taken to identify more technologies. Earlier Compendium of Prospective Emerging Technologies containing eight Emerging Technologies was brought out by BMTPC. Now the same is being updated with additional 8 technologies. The Second Edition of Compendium of Prospective Emerging Technologies for Mass Housing will contain technology details of following sixteen emerging technologies:

Formwork Systems

- 1 Formwork for Monolithic Concrete Construction
- 2 Modular Tunnel form
- 3 Sismo Building Technology

Precast Sandwich Panel Systems

- 1 Advanced Building System – EMMEDUE

- 2 Rapid Panels
 - 3 Reinforced EPS Core Panel System
 - 4 QuickBuild 3D Panels
 - 5 Concrewall Panel System
 - 6 Glass Fibre Reinforced Gypsum (GFRG) Panel System
- Light Gauge Steel Structural Systems*
- 1 Light Gauge Steel Framed Structure (LGSFS)
 - 2 Light Gauge Steel Framed Structure with Infill Concrete Panels (LGSFS-ICP)
- Steel Structural Systems*
- 1 Factory Made Fast Track Building System
 - 2 Speed Floor System
- Precast Concrete Construction Systems*
- 1 Waffle-Crete Building System
 - 2 Precast Large Concrete Panel System
 - 3 Industrialized 3-S system using cellular light weight concrete slabs & precast columns

3. Development of Knowledge Portal on Sustainable Habitat for Emerging Technologies

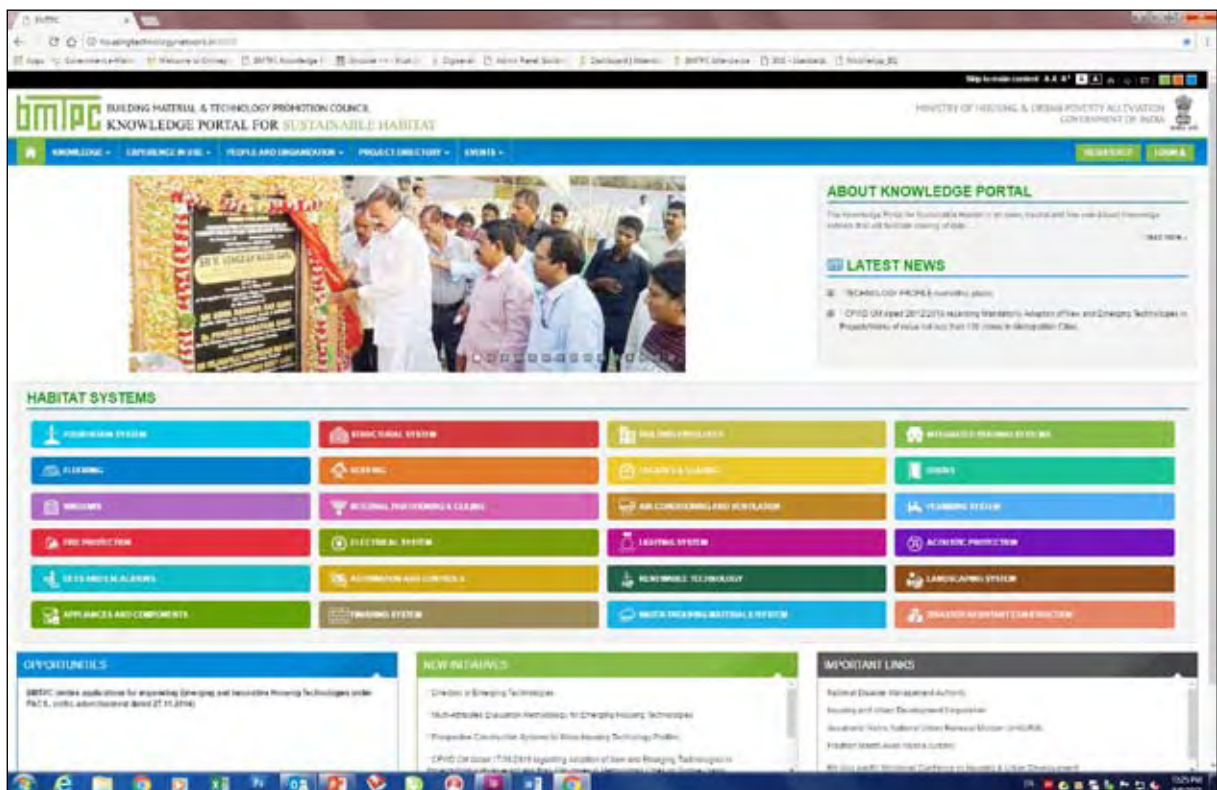
In order to create a platform to facilitate sustainable faster construction, using new prospective emerging construction systems being practiced globally, BMTPC has developed a Knowledge Portal for sustainable Habitat, where user can see the necessary information on different sustainable materials and technologies used in making a habitat. Any technology provider can get registered and provide information in standard format, which after necessary vetting will be uploaded as part of information of the portal for general users.

The portal provides all the information about emerging technologies and building materials, such as detailed description, case studies, expert opinions, cost, life cycle, comparative analysis, descriptions of building products, materials, systems, design and construction codes, best industry practices, reviews, links to manufacturers, suppliers etc. The web portal also provides design related information, standards and codes, public opinion and reviews backed by case studies, detailed description on products, materials, technology and building systems with validated list of manufacturers, suppliers, experts, designers and consultants.

The Knowledge Portal was launched by Shri M.Venkaiah Naidu, the then Hon'ble Minister of Housing & Urban Poverty Alleviation during Board of Management meeting of BMTPC on December 21, 2016 in the presence of Shri Rao Inderjit Singh, Hon'ble Minister of State for Housing & Urban Poverty Alleviation.



Shri M.Venkaiah Naidu, the then Hon'ble Minister of Housing & Urban Poverty Alleviation launched the Knowledge Portal on Sustainable Habitat during Board of Management meeting of BMTPC on December 21, 2016 at New Delhi



4. Project on “Estimate of Embodied Energy for Low Carbon Building Construction”

The Council is undertaking a Project with IIT Roorkee on “Estimate of Embodied Energy for Low Carbon Building Construction”. The objectives of the project are:

- Study of the CPWD Analysis of Rates for material breakups and computation of revised EER values of the items of work using EEV of the individual building materials.
- Upgradation of the existing data on the ‘Schedule of Energy Rates’ to the ‘Schedule of Embodied Energy Rates’.
- Application of the Schedule for a range of case studies for validation.
- Derivation of best fit equations to serve as a tool for preliminary EEE estimates.
- Development of a software tool to:
 - Directly estimate the EECT of a building construction using its, BOQ and the upgraded’ Schedule of Embodied Energy Rates’
 - Highlight the best predictors of embodied energy in the building construction under study
 - Provide suitable low embodied energy (or low carbon) substitutes for the high carbon materials used in the original construction proposal based upon regional parameters
 - Calculate the CO₂, emissions of the proposed construction
 - Estimate the reduction in CO₂ emissions with the low carbon substitutes and convert the reduced emissions into carbon credits.
- Recommendations for economizing the manufacture and use of low carbon building materials.
- Preparation of the Handbook.
- Validation of results through a small prototype construction.

Embodied energy of a proposed building can be estimated by computing the material requirements of the project, multiplying each material content with its corresponding embodied energy value (EEV) and by summation, obtaining the total EEC. The drawback with this method is that the material requirements are not directly available, but have to be computed from the Bill of Quantities (BOQ) of the project. A more efficient methodology would be to use the BOQ directly for estimating the embodied energy. The proposed project aims to present such a methodology in which the embodied energy of a building can be directly computed from its BOQ, by prescribing energy values for the individual items of work. These

values are termed as Embodied Energy Rates (EER).

The value of embodied energy of more than 500 items has been calculated and compiled. The case study of different project to validate the data is under progress.

5. Development of Compendium of Green Technologies for states of Punjab, Haryana, the Union Territory of Chandigarh (UTC), the National Capital Region (NCR) and Madhya Pradesh

The Council is undertaking a Project for Development of Compendium of Green Technologies for states of Punjab, Haryana, the Union Territory of Chandigarh (UTC), the National Capital Region (NCR) and Madhya Pradesh.

This compendium will describe the current construction practices in urban areas, lists materials and construction systems that are manufactured/ available in the region while evaluating their environmental impacts (greenness), suggests other technologies that are not yet available but would be suitable, presents case studies of exemplary projects in the region and lists design practitioners engaged in affordable and green construction. A graphic tool for representing greenness will also be developed. The building technology options for individual house, low rise & high density (3-4 storied house) and high rise buildings will also be analyzed from the point of view of greenness.

The study with findings on the parameters has been completed for NCR region of Delhi, Punjab, Haryana and presently underway for Madhya Pradesh.

6. Project on Structural Stability Assessment and Development of Design Guidelines for Expanded Polystyrene Core Panel System

The Council has undertaken a Project for Structural Stability Assessment and Development of Design Guidelines for Expanded Polystyrene Core Panel System with IIT Roorkee.

Expanded Polystyrene Core Panel System (EPS) is an emerging technology for construction of affordable buildings. In this technique a core of polystyrene is covered with welded wire mesh reinforcement and micro-concrete. This results in a light weight structural system with efficient thermal and acoustic insulation. The system can be used as load bearing wall system in low-rise buildings and as partitions in high-rise RC and steel frame buildings.

An experimental study on mechanical behavior of EPS core based RC sandwich panels is conducted. The strength estimated using these tests has been compared with that using the Indian and other codes for ordinary reinforced concrete panels. It is observed that in absence of more rigorous models for EPC-RC composite panels, the models available in codes can be used for estimating the strength with reasonable conservativeness. The tests and analysis performed in this study demonstrate that the EPS core based RC sandwich panel system is a viable construction system for seismically safe buildings.

7. Project on Durability Assessment and Enhancement of Service Life of Expanded Polystyrene Core Panel System

The Council has undertaken a Project on Durability Assessment and Enhancement of Service Life of Expanded Polystyrene Core Panel System with IIT Roorkee.

The summary of the conclusions drawn from the reported literature and the experimental tests undertaken in this study are:

1. Limited information available in the literature indicates that the minimum concrete cover to be provided to the wire mesh in sandwich panels varies from a minimum value of 15 mm (under normal environment conditions) to a maximum of 45 mm when panels are located near the coastal areas. ACI committee report on tilt up construction specifies a minimum thickness of 63.5 mm for outer non load bearing wythe. Thus based on the literature it can be concluded that there are no holistic guidelines or national/international codal provisions for the design of the concrete sandwich wall panels from the standpoint of durability.

2. With respect to the fire safety of sandwich panels the predictions of ACI committee recommendations compare reasonably well with the test results of non-load bearing walls, while they underestimate the fire ratings for load bearing walls constructed with EPS sandwich wall panels. Thus the procedure outlined in ACI 216.1-97/TMS 0216.1-97 can be safely used to determine the fire resistance rating of the concrete EPS core sandwich panels to be used in non-load bearing walls.

3. For the non-load bearing wall construction using such sandwich panels a minimum thickness of 50 mm for each concrete wythe for one hour fire rating is recommended for satisfying the requirements of NBC (Part 4): 2005. However, No clear recommendations can be made for the thickness of concrete wythes for load bearing wall

constructions where two hours of fire rating is required as per NBC (Part 4): 2005. Further investigations are required in this regard, though some limited test data shows that the thickness of each concrete wythe should be at least of 75 mm in such cases.

4. However, to achieve a fire rating of 1 hour for load bearing and non-load bearing classified under type 4 construction as per NBC (Part 4):2005, panels with minimum wythe thickness of 50 mm is recommended.

5. The experimental test results conducted at IIT Roorkee show that:

- a. The environmental exposures influence the in-plane shear and out of plane behaviour of EPS core sandwich panels. Deterioration was noted both in strength and toughness properties of the panels.
- b. Corrosive environment has more degrading effect on the structural properties of panels than the other two chosen environmental exposures i.e. alternate wetting-drying and dry heat.
- c. Across all the environmental exposures, the loss in structural properties was more pronounced on out of plane flexural behaviour than the in-plane shear performance. Thus it can be concluded that environmental exposures affect more the flexural properties than the in-plane shear behaviour of sandwich wall panels.
- d. The chosen wall panels had relatively poor composite action showing inadequacy of pin shear connectors, though no significant loss in composite action was noticed due to the chosen exposures. Hence it can be concluded that there is no deterioration of the adhesion bond between the concrete and the EPS core under the chosen exposures.
- e. As most of the in-plane diagonal shear test specimens failed prematurely due to the load transferring extra stiffened corners, these tests may not indicate the complete in-plane shear behaviour of the panels. The results thus show that some other mechanisms should be used in the regard.

6. The above mentioned tests show that aggressive environmental exposures do influence the structural and functional performance of EPS core sandwich panels and therefore a thorough and systematic investigation is required to examine the in-service behaviour of such wall panels and thereby to predict their service life.

8. Development of Fly Ash based Advanced Ligno-Silico-Aluminous Geo-polymeric Binder useful for making Cement Free Green Concrete

The Council has undertaken a Project with CSIR-AMPRI, Bhopal on “Development of Fly Ash based Advanced Ligno-Silico-Aluminous Geo-polymeric Binder useful for making Cement Free Green Concrete”. The objective of the project proposed was to develop Fly Ash based Advanced Ligno-Silico-Aluminous Geo-polymeric Binder useful for making Cement Free Green Concrete and Characterization and Evaluation of Engineering Properties of developed materials.

The agency has identified Fly-ash from the NTPC, Sarni (MP) as basic material for project work. Ligno Silico Aluminous (LSA) Alkaline Activator using Rice Husk and Alkali has been prepared and was used for making LSA based Geo polymer Concrete. The prepared Geo-polymer Concrete was tested for Compressive Strength and flexural strength at various temperature. Various physio-chemical, mineralogical and micro structural properties were also studied. The studies revealed that advanced green concrete using the Advanced Ligno-Silico-Aluminous Geo-polymeric Binder can be prepared at site and can be used for construction.

9. Development of Discarded Fishnet Reinforced Hybrid FRP sheet for Indoor Partitions: A Low Cost Housing Solution

The Council is undertaken a Project on “Discarded Fishnet Reinforced Hybrid FRP sheet for Indoor Partitions: A Low Cost housing Solution”. The project is being executed by University College of Engineering, Anna University, Nagercoil. The project focuses on the reuse of discarded fishnet as reinforcing material in polyester matrix for the manufacturing of Hybrid Fish Net Reinforced Plastics (HFNRP) and fabrication of flat panels and hollow framework.

Under the project, the mould has been designed after detailed study. Various sample of the raw materials were collected and sample sheets were prepared for testing purpose. The mould was prepared as HFNRP 1 consists of two glass fibers and one fishnet sandwiched. HFNRP 2 consists of two glass fibers and three fishnets sandwiched. HFNRP 3 consists of two glass fibers and five fishnets sandwiched. HFNRP 4 consists of two glass fibers and seven fishnets sandwiched. The flat specimens of sizes 2x2 and 3x3 were prepared and tested. The panels were tested for its tensile strength, Impact, Optical and thermal properties etc. As per report, the HFNRP 2 Panel (2 Glass Fiber and 3 Fishnet) is most suitable for Indoor Partition sheet. The documentation of report is under progress.

10. Development of Commercial Process for Utilization of Pond Ash in manufacture of Cold Setting Building Brick and Block

The Council is undertaking a project on the “Development of commercial process for utilization of pond ash in manufacture of cold setting building brick and block” jointly with CSIR-Institute of Minerals & Materials Technology (IMMT), Bhubaneswar. The objective of the project is to develop a commercial process for the use of pond ash as a raw material along with sand and mineral cementation binder in manufacture of cold setting building brick and block conforming to BIS specification IS: 12894:2002 of Class-7.5 & above.

Raw materials such as pond ash, commercial chemicals have been procured. The workable process for manufacturing of Brick and Block using pond ash from 50%-60% has been developed. Similarly, the workable process for manufacturing of Brick and Block using pond ash from 70% has been developed. The manufactured blocks were tested for various physical and chemical properties. The developed process is being optimized and related experiments about its economics of scale were also conducted. The preparation of report is under progress.

11. Project on Construction of Dwelling Unit with Innovative Sustainable & Economical Technology of In-Situ Casting with Light Weight Cellular Concrete

The Council is undertaking a project on Construction of Dwelling Unit with Innovative Sustainable & Economical Technology of In-Situ Casting with Light Weight Cellular Concrete jointly with Ashkings Enterprises, Nashik. The main objective of the project is to provide demonstration of sustainable and affordable technology developed at lab scale using flow able lightweight cellular concrete replacing the requirement of bricks, blocks etc. for construction of houses.

The new technology is in-situ casting and material proposed provides required strength, safety as well as thermal insulation. It's economical and eco-friendly. It is proposed to construct a dwelling unit of 1 BHK having area of 25 sq.mts. The project also includes the quality and strength tests/evaluation of light weight cellular concrete that would be used for the construction of the house. Electrical, plumbing & sewerage fitting would also be done to have a complete demonstration of a dwelling unit. The light weight cellular concrete blocks were casted at site and tested for various properties. The casting of dwelling unit is under progress.

VIII. PROJECTS UNDER 10% LUMP-SUM PROVISION FOR NER STATES INCLUDING SIKKIM AND JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION (JNNURM)

1. BMTPC's Role in Implementation of projects under 10% Lump-Sum Provision for NER States including Sikkim

The then Ministry of Housing & Urban Poverty Alleviation, Govt. of India, is implementing projects under 10% Lump-sum Provision for NER States including Sikkim. The Council has been designated as one of the Appraisal Agencies for appraising the projects received under 10% Lump-sum Provision for NER States including Sikkim. Scrutiny of the following projects was done to assess their technical viability:

S. No	State	City/Town	Project Name	Project Cost (in lakhs)
DPR Appraised and report submitted				
	Arunachal Pradesh	Yingkiong	Construction of Vendors Market	1730.00
	Arunachal Pradesh	Seppa	Construction of EWS Housing	1815.84
	Nagaland	Kohima	Construction of State urban Resource Centre for Poverty Alleviation cum Skill Training Centre	1105.21
	Nagaland	Shamator	Construction of Working Women Hostel	897.20
	Nagaland	Mokokchung	Construction of Working Women Hostel	937.14
	Nagaland	Kohima	Construction of Working Women Hostel	1331.70
Observations on DPR submitted				
1.	Arunachal Pradesh	Yingkiong	Construction of Vendors Market	2100.00
2.	Arunachal Pradesh	Daparijo	Construction of Affordable Housing	1262.41
	Arunachal Pradesh	Daparijo	Construction of Multi-Utility Project	2330.52
	Nagaland	Tuli	Construction of Market Complex	497.20
	Nagaland	Kiphire	Construction of Market Complex-cum Car Parking	854.24

2. BMTPC's Role in Implementation of projects under JNNURM

Appraisal of Detailed Project Reports (DPRs) under JNNURM

BMTPC was involved in the implementation of the JNNURM sub-components Basic Services to Urban Poor (BSUP) and Integrated Housing & Slum Development Programme (IHSDP) for Appraisal of DPRs, Monitoring of Projects, Third Party Inspection & Monitoring (TPIM) Reviews, and organization of capacity building programmes.

During the year, TPIM Review of the following States were undertaken and reports were submitted to the Mission Directorate:

Sl.No.	Name of State	TPIM Review Reports Submitted to Mission Directorate
	Bihar	2
	Chandigarh	4
	Chhattisgarh	4
	Delhi	5
	Gujarat	4
	Rajasthan	1
	Total	20

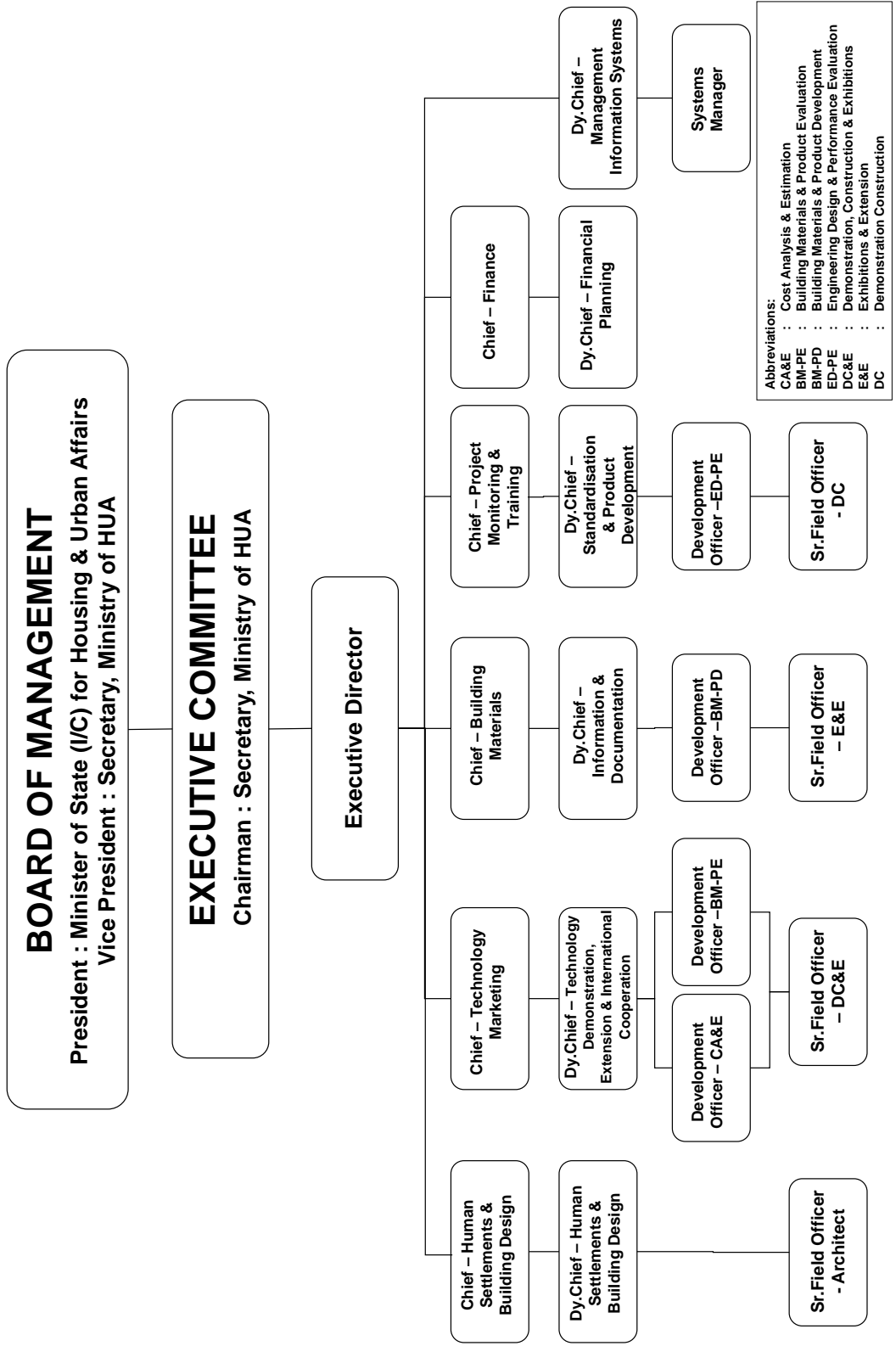
ORGANISATION

The organizational structure of the Council is depicted at next page. As on 31st March, 2017, BMTPC had a staff strength 38 comprising 20 officers and 18 supporting staff. Also technicians/professionals are hired on contract on project and need basis.

The Council has continued following administrative and financial measures for bringing transparency, responsiveness and greater participation of the employees:

- Implementation of modified Byelaws, Recruitment-cum-Promotion Rules and Delegation of Power.
- Internal Committee for smooth and harmonious functioning of the Council:
 - Investment Committee
 - Advertisement Committee
 - Printing Committee
 - Local Purchase Committee
 - Store Purchase Committee
 - Transport Committee
 - Contractual Payment Committee
- To redress citizen grievances, online handling of the public grievances through centralized public grievances redress and monitoring system has been initiated.
- Nominated an officer as the Director of grievances and an officer as Welfare Officer for smooth functioning of the organization and to find out the solution of the grievances of the staff members.
- SCs & STs Cell for welfare and development of Scheduled Casts & Scheduled Tribes
- Implementation of RTI Act, 2005
- Committee for Prevention of Sexual Harassment of women at workplace.
- Independent audit of implementation of Citizen's Charter.
- Independent audit of implementation of public grievance redressal system.

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL ORGANISATION CHART



STAFF STRENGTH (as on 31.3.2017)

<u>S.No.</u>	<u>Name & Designation</u>	<u>Date of Joining</u>
1.	Dr. Shailesh Kr. Agrawal <i>Executive Director</i>	17.01.08
2.	S.Balasrinivasan <i>Chief-Finance</i>	08.04.92
3.	M. Ramesh Kumar <i>Chief- Human Settlements & Building Design</i>	01.04.93
4.	Arun Kumar Tiwari <i>Chief-Project Monitoring & Training and Administration</i>	22.07.03
5.	S.K.Gupta <i>Deputy Chief- Technology, Demonstration Extension & International Cooperation</i>	26.10.93
6.	Arvind Kumar <i>Deputy Chief- Management Information Systems</i>	15.04.99
7.	Chandi Nath Jha <i>Deputy Chief- Standardization & Product Development</i>	09.09.99
8.	Pankaj Gupta <i>Deputy Chief-Information & Documentation</i>	14.10.99
9.	D.P.Singh <i>Development Officer-Engineering Design & Product Evaluation</i>	05.10.98
10.	Dalip Kumar <i>Senior Field Officer- Demonstration Construction & Exhibition</i>	04.03.91
11.	Alok Bhatnagar <i>Senior Field Officer- Exhibition & Extension</i>	05.10.98
12.	Akash Mathur <i>Senior Field Officer- Architect</i>	01.01.02
13.	Anita Kumar <i>Sr. Programmer</i>	03.10.96
14.	M.Ramakrishna Reddy <i>Liaison Officer</i>	29.10.03
15.	Pankaj Gupta <i>Personnel Officer</i>	01.03.94
16.	Praveen Suri <i>Systems Analyst</i>	01.09.94
17.	S.S.Rana <i>Library Officer</i>	01.04.98
18.	D.Prabhakar <i>Field Officer</i>	29.01.04
19.	Ashwani Kumar <i>Asstt. Field Officer</i>	01.01.02
<u>Superannuation</u>		
1.	J.K.Prasad <i>Chief-Building Materials</i> (Superannuated on 30.12.2016)	01.09.03

ACCOUNTS

The Council received grants of Rs. 500 lakhs from the Ministry of Housing & Urban Affairs, Government of India during the FY 2016-17. In addition, grants of Rs. 254 lakhs sanctioned during FY 2015-16 was carried forward, apart from receipts from other sources like Fees, Consultancy, Training, NHB, UNDP, Interest, Publications, etc. were Rs. 281 lakhs. The total expenditure incurred was Rs.1239 lakhs during the year, as per Receipt & Payment Account Statement. A summary of expenditure is given below:

Major Heads	Amount (in Rs.)
<ul style="list-style-type: none"> Construction of Demonstration Housing Projects in different parts of India & Expenditure on technical activities including Financial Assistance for technology development/application and Sponsored Studies 	5,13,37,302
<ul style="list-style-type: none"> Organisation and participation in various Seminars, Conferences, Workshops Housing for All (Handholding, Documentation, Sensitization and Capacity Building), S&T support to various schemes of Ministry, Technology Sub-Mission, Mainstreaming Emerging Technologies through Dissemination, Knowledge Transfer with State Govt. 	3,07,03,092
<ul style="list-style-type: none"> Expenses towards Capacity Building and Training Programmes and other activities relating to UNDP, Building Centers, BIPARD and others 	9,09,003
<ul style="list-style-type: none"> Expenditure on Salary, Establishment & Administration expenses including office equipments, computer peripherals, etc. 	4,09,43,162
TOTAL	12,38,92,559

The Accounts have been audited by M/s Gupta Nanda & Co., Chartered Accountants, the balance sheet and the statement of accounts of the year 2016-17 is placed in the report.

GUPTA NANDA & CO.
CHARTERED ACCOUNTANTS

Address:

**S-1, FIRST FLOOR,
RAJOURI GARDEN,
NEW DELHI-110027**
PHONE: 25459787, 9582950999, 45577987
BRANCH: JAIPUR
E-mail- guptananda123@yahoo.co.in
Website: www.guptananda.com

Head Office: 20-A, LIG FLATS, NEAR CAMBRIDGE SCHOOL, RAJOURI GARDEN, NEW DELHI-110027

INDEPENDENT AUDITOR'S REPORT

To

The Members,
Building Materials & Technology Promotion Council
New Delhi

Report on the Financial Statements

We have audited the accompanying financial statements of BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL ("the SOCIETY") registered under the Societies Registration Act 1860, which comprise the Balance Sheet as at March 31,2017 and statement of Income and Expenditure for the year ended and a summary of significant accounting policies and other explanatory information.

Management Responsibility for the Financial Statement

Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance in accordance with the Accounting Principles generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.



GUPTA NANDA & CO. **CHARTERED ACCOUNTANTS**

Address:

**S-1, FIRST FLOOR,
 RAJOURI GARDEN,
 NEW DELHI-110027
 PHONE: 25459787, 9582950999, 45577987
 BRANCH: JAIPUR
 E-mail- guptananda123@yahoo.co.in
 Website: www.guptananda.com**

Head Office: 20-A, LIG FLATS, NEAR CAMBRIDGE SCHOOL, RAJOURI GARDEN, NEW DELHI-110027

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are from materials misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of materials misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Society's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained are sufficient and appropriate to provide a basis for our unqualified audit opinion.

Basis for Opinion:**Opinion**

In our opinion and to the best of our information and according to explanation given to us, the financial statements give the information required in the manner so required in the manner so required and give true and fair view in conformity with the accounting principles generally accepted in India:

- (a) In case of Balance Sheet, of the state of affairs of the society as at March 31, 2017:
- (b) In case statements of Income and Expenditure Account, of the Surplus for the year ended on that date:
and
- (c) In case of Receipts and payment Account of Receipts and payments for the year ended on that date.



GUPTA NANDA & CO.
CHARTERED ACCOUNTANTS

Address:

**S-1, FIRST FLOOR,
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Head Office: 20-A, LIG FLATS, NEAR CAMBRIDGE SCHOOL, RAJOURI GARDEN, NEW DELHI-110027

Report on Other Legal and Regulatory Requirements:

We report that:

- (a) We have obtained all the information and explanation, which to the best of our knowledge and belief were necessary for the purpose of our audit.
- (b) In our opinion, proper books of accounts as required by the law have been kept by the Society so far as it appears from our examination of the books.
- (c) In our opinion, the balance Sheet & Statement of Income & Expenditure account dealt with by the report complies with the accounting Standards issued by the Institute of Chartered Accountant of India.
- (d) The balance Sheet & Statement of Income & Expenditure account dealt with by this Report are in agreement with the book of accounts.
- (e) The receipt and Payment Account dealt with by this report are in agreement with the books of accounts.

Place: New Delhi

Date: 06/10/2017

**For M/S GUPTA NANDA & CO.
(Chartered Accountants)**

FRN: 9039N



Vivek Garg

(VIVEK GARG)

ACA Partner

M.NO.: 528139



Building Materials & Technology Promotion Council

Ministry of Housing & Urban Affairs, Government of India

BALANCE SHEET AS ON 31 MARCH 2017

Amount (₹)

	Schedule	2016-17	2015-16
<u>CORPUS/CAPITAL FUND AND LIABILITIES</u>			
CORPUS/CAPITAL FUND	1	1,000,000	1,000,000
RESERVES AND SURPLUS	2	260,659,557	281,920,015
EARMARKED FUNDS	3	2,942,159	1,162,578
CURRENT LIABILITIES AND PROVISIONS	4	3,471,556	26,865,458
TOTAL		268,073,272	310,948,051
<u>ASSETS</u>			
FIXED ASSETS	5	35,264,165	38,607,056
CURRENT ASSETS, LOANS & ADVANCES ETC.	6	232,809,107	272,340,995
TOTAL		268,073,272	310,948,051
SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO THE ACCOUNTS	14		

As per our report of even date attached.

For Gupta Nanda & Co.
Chartered Accountants



For Building Materials & Technology
Promotion Council

S.B. Srinivasan

S. Balasrinivasan
(Chief - Finance)

Dr. Shailesh Kr. Agrawal
(Executive Director)

Place : Delhi

Date : 06.10.2017

bmtpc Building Materials & Technology Promotion Council
Ministry of Housing & Urban Affairs, Government of India

**INCOME & EXPENDITURE ACCOUNT
FOR THE YEAR ENDED 31 MARCH 2017**

		Amount (₹)	
	Schedule	2016-17	2015-16
INCOME			
Grants / Subsidies	7	75,403,834	104,596,166
Jnnurm Monitoring/Appraisal/TPIMA/Ray Fees/Training Programmes Receipts	8	1,689,965	77,795,615
Income from Publications and PAC's Fee etc.	9	1,909,805	931,090
Interest Earned	10	17,183,950	13,671,270
TOTAL (A)		96,187,554	196,994,141
EXPENDITURE			
Expenditure on Salary, Establishment & Administration	11	35,747,978	35,327,596
Expenditure on Dissemination / Seminars/Workshops, Training Programmes, HFA, JNNURM etc.	12	30,703,092	33,046,647
Expenditure on Financial Assistance, Sponsored Studies etc.	13	46,078,740	40,379,722
Depreciation	5	4,918,202	900,903
TOTAL (B)		117,448,012	109,654,868
Excess of income over expenditure (A-B)		-	87,339,273
Excess of Expenditure over Income(A-B)		(21,260,458)	-
BALANCE BEING DEFICIT/SURPLUS CARRIED TO BALANCE SHEET		(21,260,458)	87,339,273

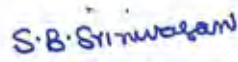
As per our report of even date attached.

For Gupta Nanda & Co.
Chartered Accountants

FRN: 9039N

Vivek Garg
(Partner)
M.No. 528139

For Building Materials & Technology
Promotion Council


S. Balasrinivasan
(Chief - Finance)


Dr. Shailesh Kr. Agrawal
(Executive Director)

Place : Delhi
Date : 06.10.2017



Building Materials & Technology Promotion Council
Ministry of Housing & Urban Affairs, Government of India

**RECEIPTS & PAYMENT ACCOUNT
FOR THE YEAR ENDED 31 MARCH 2017**

Amount (₹)

	2016-17	2015-16	
RECEIPTS			
1 Opening Balance			
Cash Balances in hand	58,289		31,744
Bank Balances			
With Scheduled Banks:			
- On Deposit Account	127,383,062		129,634,094
- On Savings Accounts:			
- Canara Bank	113,850,456		11,190,004
- State Bank Of India	6,508,108	247,741,626	1,961,214
<u>142,785,312</u>			<u>142,785,312</u>
2 Grants-in-aid from Central Government (Ministry of Housing & Urban Affairs)	50,000,000		130,000,000
3 Receipts towards JNNURM Monitoring/Appraisal/TPIMA/RAY Fees/UNDP/Training Programme receipts	2,069,965		72,201,431
4 Security Deposit etc.	2,037,264		150,431
5 Receipts from NHB towards Demonstration Housing Project at Odisha	7,040,000		-
6 Income from Publications etc.	1,909,805		931,090
7 Interest Earned	15,025,306		14,822,500
TOTAL	325,882,255		360,922,508
PAYMENTS			
1 Purchase of Fixed Assets	1,575,311		587,475
2 Expenditure on Salary, Establishment & Administration	35,368,164		35,484,229
3 Expenditure on Training Programmes, Seminars/Workshops, etc.	30,703,062		31,869,791
4 Expenditure on Financial Assistance, Sponsored Studies, HFA etc.	46,090,886	113,737,453	40,367,576
5 Loan & advances (Net)		3,999,687	-
6 Security Deposit etc.		395,000	605,431
7 Earmarked funds			
BIPARD	20,253		232,436
Rejuvenation and strengthening of Building Centers	30,000		440,000
UNDP-Developing Toolkit for Urban Managers	858,750		-
Demonstration Housing Project at Odisha	4,851,416	5,760,419	-
8 Expenditure on JNNURM			1,176,856
9 Closing Balance			
Cash Balances in hand		8,217	58,289
Bank Balances			
With Scheduled Banks:			
- On Deposit Account	187,200,000		127,383,062
- On Savings Accounts:			
- Canara Bank	10,213,390		113,850,456
- State Bank Of India	4,568,089	201,981,479	6,508,108
<u>201,981,479</u>			<u>247,741,626</u>
TOTAL	325,882,255		360,922,508

As per our report of even date attached.

For Gupta Nanda & Co.
Chartered AccountantsPlace : Delhi
Date : 06.10.2017For Building Materials & Technology
Promotion Council

S. Balasrinivasan
(Chief - Finance)

Dr. Shailesh Kr. Agrawal
Executive Director



Building Materials & Technology Promotion Council

Ministry of Housing & Urban Affairs, Government of India

SCHEDULES FORMING PART OF BALANCE SHEET AS ON 31 MARCH 2017

Amount (₹)

SCHEDULE 1- CORPUS/CAPITAL FUND	2016-17	2015-16
Balance as at the beginning of the year	1,000,000	1,000,000
TOTAL	1,000,000	1,000,000

SCHEDULE 2- RESERVES AND SURPLUS	2016-17	2015-16
1. Capital Reserve		
Opening Balance	88,350,448	87,762,973
Addition during the year	1,575,311	587,475
2. Excess of Income over Expenditure		
Opening Balance	193,569,567	106,817,769
Less : Amount transferred from Income & Expenditure A/c	21,260,458	87,339,273
	172,309,109	194,157,042
Less transferred to Capital Reserve	1,575,311	587,475
TOTAL	260,659,557	281,920,015

SCHEDULE 3- EARMARKED FUNDS	2016-17	2015-16
1 BIPARD PROJECT		
Opening Balance	20,253	252,689
Less : Utilisation/Expenditure during the year	20,253	232,436
2 Rejuvenation and strengthening of Building Centers		
Opening Balance	642,325	1,082,325
Less : Utilisation/Expenditure during the year	30,000	440,000
3 UNDP-Developing Toolkit for Urban Managers		
Opening Balance	500,000	500,000
Received during the year	500,000	-
Less : Utilisation/Expenditure during the year	858,750	141,250
4 Demonstration Housing Project at Odisha		
Received during the year	7,040,000	-
Less : Utilisation/Expenditure during the year	4,851,416	-
TOTAL	2,942,159	1,162,678

SCHEDULE 4- CURRENT LIABILITIES AND PROVISIONS	2016-17	2015-16
CURRENT LIABILITIES		
- Outstanding Liabilities	806,015	438,347
- Security Deposit	2,665,541	1,023,277
- Balance of Grants carried forwarded	-	25,403,834
TOTAL	3,471,556	26,865,458



SCHEDULES FORMING PART OF BALANCE SHEET AS ON 31 MARCH 2017

	SCHEDULE 5- FIXED ASSETS						Amount (₹)	
	GROSS BLOCK			DEPRECIATION			2016-17	2015-16
	Cost as at 01.4.16	Additions	Total	Upto 01.04.16	Current year	Upto 31.03.17	NET BLOCK As at 31.03.17	NET BLOCK As at 31.03.16
Land	749,317	-	749,317	-	-	-	749,317	749,317
Office Building	33,570,500	-	33,570,500	-	3,357,050	3,357,050	30,213,450	33,570,500
Furniture and Fixtures	3,648,651	13,356	3,662,007	2,754,506	90,082	2,844,588	817,419	894,145
Office Equipments	19,590,614	-	19,590,614	17,644,916	291,855	17,936,771	1,653,843	1,945,698
Computers/ Peripherals	17,209,621	1,561,955	18,771,576	17,020,535	990,469	18,011,004	760,572	189,086
Air conditioners	1,035,166	-	1,035,166	697,529	50,646	748,175	286,991	337,637
Fan & Coolers	81,224	-	81,224	51,023	4,530	55,553	25,671	30,201
TV and VCR	380,450	-	380,450	323,744	8,505	332,249	48,201	56,706
Exhibits, Panels, Display Models	12,084,905	-	12,084,905	11,251,139	125,065	11,376,204	708,701	833,766
	88,350,448	1,575,311	89,925,759	49,743,392	4,918,202	54,661,594	35,264,165	38,607,056
Previous Year (2015-16)	87,762,973	587,475	88,350,448	48,842,489	900,903	49,743,392	38,607,056	38,920,484





SCHEDULES FORMING PART OF BALANCE SHEET AS ON 31 MARCH 2017

SCHEDULE 6 - CURRENT ASSETS, LOANS, ADVANCES ETC.	Amount (₹)			
	2016-17		2015-16	
A. CURRENT ASSETS:				
1. Cash in hand	-	8,217	-	58,289
2. Bank Balances				
- On Deposit Account	187,200,000		127,383,062	
- On Savings Accounts:				
- Canara Bank	10,213,390		113,850,456	
- State Bank of India	4,568,089	201,981,479	6,508,108	247,741,626
B. LOANS, ADVANCES AND OTHER ASSETS				
1. Advances to staff	4,735,966	4,735,966	2,489,084	2,489,084
2. Advances and other amounts recoverable in cash or in kind or value to be received				
a.Amount Recoverable & other Advances	6,038,760		4,285,955	
b.Security Deposit (Space)	420,000		420,000	
c. Tax Deducted at Source Recoverable	8,639,914	15,098,674	8,519,914	13,225,869
3. Interest Accrued on FDR's		10,984,771		8,826,127
TOTAL (A + B)		232,809,107		272,340,995





Building Materials & Technology Promotion Council

Ministry of Housing & Urban Affairs, Government of India

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED AS ON 31 MARCH 2017

	Amount (₹)	
	2016-17	2015-16
SCHEDULE 7- GRANTS/SUBSIDIES (Irrevocable Grants & Subsidies Received)	2016-17	2015-16
1 Central Government (Ministry of Housing & Urban Affairs, Government of India)	50,000,000	130,000,000
Add: Unutilised Grants Brought Forwarded from Financial Year 2015-16	25,403,834	-
Less: Unutilised Grants carried forwarded to Financial Year 2016-17	-	25,403,834
TOTAL	75,403,834	104,596,166
SCHEDULE 8 - FEES/SUBSCRIPTIONS	2016-17	2015-16
1 JNNURM Monitoring/Appraisal/TPIMA/RAY fees from Ministry of Housing & Urban Affairs & Training Programme Fees	1,689,965	77,795,615
TOTAL	1,689,965	77,795,615
SCHEDULE 9- INCOME FROM PACS FEE, PUBLICATION ETC.	2016-17	2015-16
1 Receipts towards sale of publications, PACS etc	1,909,805	931,090
TOTAL	1,909,805	931,090
SCHEDULE 10- INTEREST EARNED	2016-17	2015-16
1 On Term Deposits With Scheduled Banks	13,889,687	11,031,251
2 On savings Accounts With Scheduled Banks	2,910,174	2,058,754
3 On Advance to employees	384,089	581,265
TOTAL	17,183,950	13,671,270
SCHEDULE 11- EXPENDITURE ON SALARY, ESTABLISHMENT & ADMINISTRATION	2016-17	2015-16
1 Pay and Allowances	27,321,861	25,684,482
2 Leave Travel Concession	400,325	240,745
3 Reimbursement of Medical Expenses	1,313,194	1,038,504
4 Honorarium	351,500	241,000
5 Administration Expenses	6,361,098	8,122,865
TOTAL	35,747,978	35,327,596
SCHEDULE '12' - EXPENDITURE ON DISSEMINATION / SEMINARS/WORKSHOPS, TRAINING PROGRAMMES, HFA,JNNURM ETC.	2016-17	2015-16
1 Exhibition and publicity	2,255,858	2,739,508
2 Seminar and Conference Expenses	1,174,313	5,274,532
3 Printing, Publication & Advertisement	2,136,082	1,172,642
4 Books and Periodicals	60,157	37,934
5 JNNURM Expenditure	-	1,176,856
6 Supervision and Monitoring of Demonstration Housing Project in various parts of India	3,461,249	3,136,503
7 Housing for All(Handholding, documentation, sensitization & Capacity Building)	11,520,693	8,053,336
8 S&T support to various schemes of ministry i.e 10% NE,NULM	1,684,352	1,004,252
9 Technology Submission	3,024,406	5,414,047
10 Main stream Emerging Technologies through Dissemination, Transfer and Exchange with State Government	5,385,982	5,037,037
TOTAL	30,703,092	33,046,647





Building Materials & Technology Promotion Council
Ministry of Housing & Urban Affairs, Government of India

**SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT
FOR THE YEAR ENDED AS ON MARCH 2017**

SCHEDULE '13' - EXPENDITURE ON SPONSORED STUDIES, FINANCIAL ASSISTANCE, ETC.	Amount (₹)	
	2016-17	2015-16
A Building Materials & Construction Technologies		
1 construction of dwelling units with innovative sustainable and economical technology in situ casting with light weight cellular concrete	492,850	-
2 Construction of demonstration houses at Telangana, Hyderabad	1,815,661	-
3 Development of work specification and analysis of rates for GFRG	187,500	-
4 Development of commercial process for utilisation of pond ash in manufacture of cold setting building brick and block	881,475	-
5 Documentation of housing project involving new construction technologies in the state of Delhi-NCR, Maharashtra, Karnataka and West Bengal	287,500	-
6 Guidelines of utilisation of C&D waste in construction of dwelling units & related infrastructure in housing scheme of Govt.	965,663	-
7 Regional workshop under PMAY HFA at Vishakhapatnam	10,501	-
8 Regional workshop under PMAY HFA at Agartala, Tripura and Training Programme for Masons, Beneficiaries and Engineers of Tripura on disaster resistant construction under BLC of PMAY	457,178	-
9 Workshop on utilisation of construction & demolition c&d waste in construction of dwelling units & related infrastructure	312,642	-
10 Assessment of statewide total brick requirement and number of clay brick being manufactured in India	541,266	-
11 Construction of demonstration houses at Lucknow	2,598,829	-
12 Demonstration of bamboo based technology in New Delhi	176,208	-
13 International Seminar on emerging building material & construction technologies	190,954	-
14 Construction of demonstration houses at Bhubaneswar	1,478,591	190,887
15 Construction of demonstration houses and community centre at Nellore	25,483,476	26,763,627
16 Development of concrete columns for low cost housing	250,000	300,000
17 Structural stability assessment and development of guidelines for expanded polystyrene core panel system	200,000	800,000
18 Estimation of embodied energy for low carbon building construction	169,200	338,400
19 Durability of assessment & enhancement of service life of expanded polystyrene core panel system	150,000	600,000
20 Performance appraisal certification scheme	644,319	923,097
21 Development of discarded fishnet reinforced hybrid sheet for indoor partition	358,911	101,750
22 Developing portal titled knowledge network for sustainable habitat in India	815,911	427,775
23 Seismic Performance studies on bamboo structure in North East	100,000	200,000
24 Construction of demonstration houses at Bihar Sharif	1,965,549	61,721
25 HUMotor: A Human way to utilize the human efforts at workplace by IIT, Madras	480,000	300,000
26 GFRG structures using building information models	16,070	314,486
27 Preparation of compendium of green technology for different geo climate zones for three states Delhi, Punjab & Haryana including Noida & Greater Noida	368,000	548,400
28 Brain storming session on promotion of prefab sector for mass Housing jointly with HPL		106,465
29 Conference on Emerging technologies in housing & building construction at New Delhi		234,486



SCHEDULE '13' - EXPENDITURE ON SPONSORED STUDIES, FINANCIAL ASSISTANCE, ETC.	Amount (₹)	
	2016-17	2015-16
30 Design & Planning of affordable innovative green social housing(Coastal region & plain region)	-	50,000
31 Guidelines for utilisation of C&D waste in construction of dwelling units & related infrastructure in housing scheme of Govt.	-	732,450
32 Testing & validation of multi attributes evaluation framework for emerging technologies for housing	-	149,995
33 Development of schedule of rates on emerging technologies	-	372,500
34 Preparation of compendium of green technology for different geo climate zones for Madhya Pradesh	-	297,500
35 Documentation of traditional housing typology for the poor, based on building material usage in Andhra Pradesh	-	237,500
36 Design of housing option for the poor for different geo climate zones in the coastal areas of Andhra Pradesh	-	237,500
37 Development of fly ash based advanced Ligno-Silico-Aluminous Geopolymeric Binder useful for making cement free green concrete	-	647,220
38 Developing matrix for selection emerging technologies based on multi attributes as well as evaluation methodology	-	222,472
39 Workshop on standard & Specification for design & planning of affordable innovative green housing	-	3,445
40 Workshop & Training programme on bamboo based structure at Dimapur, Nagaland	-	100,000
Sub-Total (A)	41,398,254	35,261,676





Building Materials & Technology Promotion Council

Ministry of Housing & Urban Affairs Government of India

**SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT
FOR THE YEAR ENDED AS ON 31 MARCH 2017**

Amount (₹)

SCHEDULE '13' - EXPENDITURE ON SPONSORED STUDIES, FINANCIAL ASSISTANCE, ETC.	2016-17	2015-16
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B Capacity Building & Skill Development

1	Development of basic audio visual training modules	491,832	-
2	Development of online courses on emerging technologies under subject catalyzing the market for affordable housing at IIT Kharagpur	373,750	-
3	Development of online courses on emerging technologies under subject catalyzing the market for affordable housing at IIT-Roorkee	498,525	-
4	Consultation on shallow masonry domes alternative traditions in roofing system	173,421	-
5	Training Programme on bamboo based toilet construction at Kaziranga, Assam	700,000	-
6	Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing, Dehradun, Uttarakhand	214,697	-
7	Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing, Gandhi Nagar, Gujarat	134,149	-
8	Capacity Building Programme on Good Construction Practices including Emerging Technologies for Housing organised at Portblair, Andaman & Nicobar Islands	347,039	-
9	Capacity Building Programme on Good Construction Practices for Construction of Housing under BLC of PMAY at Bihar Shariff for beneficiaries, masons & engineers for BLC	41,735	-
10	Workshop & Training Programme on bamboo based technology and toilet construction at Itanagar	100,000	300,000
11	Workshop & Training Programme on bamboo based technology and toilet construction at Imphal, Manipur	100,000	300,000
12	Capacity building programmes on good construction practices including emerging technologies in Vadodara, Gujarat	-	286,326
13	Capacity building programmes on good construction practices including emerging technologies in Jaipur, Rajasthan	-	310,810
14	Capacity building programmes on good construction practices including emerging technologies in Bhubaneswar, Orissa	-	200,000
15	Capacity building programme on Good construction practices including Emerging Technologies in the state of Sikkim at Gangtok	-	260,790
16	Capacity Building Programme on E.Q.R structures & retrofitting of building at Panchkula	-	196,929
17	Assessment of building artisans for BMTPC artisan certification in Gujarat	-	412,000
18	Pilot Training assessment & certification of 270 nos. building artisans in NCR, Uttarakhand & Gujarat on 5 modules i.e Assistant masons, Bar Bender, Concreting, Shuttering & Masons	-	1,241,790
19	Preparation of 5 training manual i.e Assistant masons, Bar Bender, Concreting, Shuttering & Masons for artisan in Hindi	-	850,500

Sub-Total (B)

3,175,148

4,359,145



		Amount (₹)	
SCHEDULE '13' - EXPENDITURE ON SPONSORED STUDIES, FINANCIAL ASSISTANCE, ETC.		2016-17	2015-16
C	Disaster Mitigation & Management		
1	Design, development & implementation of mobile application for earthquake hazard zoning maps of India	211,863	-
2	Technical workshop for Engineers in Aizwal to develop capacity in Earthquake Resistant Construction	400,000	-
3	Disaster management plan for M/o Hupa	162,500	-
4	Training Programme on seismic design of multi storey building : IS 1893 vs Eurocode 8	730,975	247,225
5	Training Programme on nonlinear analysis and performance based design of building	-	329,736
6	Preparation of revised vulnerability Atlas of India	-	87,603
7	Organisation of training of trainers with BIPARD on earthquake resistant design & construction at Patna	-	94,337
Sub-Total (C)		1,505,338	758,901
TOTAL (A+B+C)		46,078,740	40,379,722



SCHEDULE 14: SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO THE ACCOUNTS

1 Significant Accounting Policies

- a) **System of Accounting:** The accounts have been prepared to comply with all material aspects with applicable principals in India and notified Accounting Standards.
 - b) **Fixed Assets:** Fixed assets are stated at cost of acquisition less accumulated depreciation provided as per income tax act 1961. All the fixed assets are recognized as per the rules and regulations as provided in the General Financial Rules, 1963, amended upto date.
 - c) **Depreciation:** Depreciation is provided at written down values rates and in the manner as specified in the Income Tax Act 1961.
 - d) **Government Grants:**
 - (i) Government Grants received during the year are accounted in accordance with Accounting Standard 12 on 'Accounting for Government Grants' issued by ICAI.
 - (ii) Earmarked funds received for specific purpose are utilized for the purpose for which funds are received and the unspent balance of such funds are carried forward until fully utilized or refunded.
 - e) **Retirement Benefits:**
 - (i) The Council contributes to its own Provident Fund Trust which is recognized by the Income Tax authorities and the contributions paid during the year to Provident Fund Trust are charged to revenue.
 - (ii) Liability in respect of Gratuity to employees is provided for by way of annual premium paid to LIC under Group Gratuity Scheme.
 - (iii) Liability in respect of Leave Encashment payable to the employees is provided for by way of annual premium paid to LIC of master policy and the premium paid is charged to revenue.
 - f) **Income and Expenditure:** Since there are large number of income and expenditure accounting heads, expenses and revenue of similar nature and falling under different Heads are clubbed together wherever required for better presentation of financial statements.
 - g) **General:** Accounting policies not specifically mentioned are otherwise in consonance with generally accepted accounting practices.
- 2 **Contingent Liabilities:** Claims against the Council not acknowledged as debts - NIL.
 - 3 In opinion of the Management, the amount on realization of current assets, loans and advances in the ordinary course of business would not be less than the amount at which they are stated in the Balance Sheet. Further, provision for all known liabilities has been made in the accounts.
 - 4 As there is no taxable income under the Income Tax Act, 1961, provision for Income Tax has not been made in the accounts. The Council is regularly depositing TDS, Service Tax and other statutory liabilities.
 - 5 Land & building amounting to Rs. 3,43,19,817/- as on 01.04.2016 has been segregated from the current financial year, the value of land & building is shown separately in the fixed assets schedule and also depreciation is charged on office building.
 - 6 Figures have been rearranged & regrouped wherever required and all the above said information has been given by the management and relied upon by the auditors.
 - 7 Schedule 1 to 14 annexed to and form integral part of financial statements for the year ended 31.03.2017.

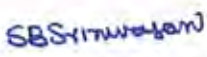
As per our report of even date attached.

For **Gupta Nanda & Co.**
Chartered Accountants
FRN: 9039N

Vivek Garg
(Partner)
M.NO 528139

Place : Delhi
Date : 06.10.2017

For Building Materials & Technology
Promotion Council


S. Balasrinivasan
Chief (Finance)


Dr. Shailesh Kr. Agrawal
(Executive Director)

PARTICIPATION IN NATIONAL AND INTERNATIONAL EVENTS**I. EXHIBITIONS**

During the year, the Council actively participated in various exhibitions which have helped in sharing knowledge and experience in cost effective & emerging, environment friendly and energy efficient building materials, construction technologies and simple machines for production of building components including emerging technologies:

- Global Bamboo Summit organized by Madhya Pradesh State Bamboo Mission (MPSBM) & Indian Federation of Green Energy (IFGE) from 8th – 10th April, 2016 at Indore (MP)
- Government Achievements & Schemes Expo-2016 organised by National News Service (NNS) Events & Exhibitions Pvt. Ltd. from 22nd-24th July 2016 at New Delhi
- 20th National Exhibition on Vision of India for a New Era organised by Central Calcutta Science & Culture Organisation for Youth on 10th – 14th August 2016 at Kolkata
- Indian National Exhibition-cum-Fair 2016 organised by Bengal Human Resource Development Foundation on 29th August-02nd September 2016 at Kolkata
- TARAGram Yatra 2016: Policy shifts for Implementing the SDGs in India Development Alternative on 20th- 22nd September 2016 at New Delhi
- India International Trade Fair from 14-27 November, 2016 at Pragati Maidan, New Delhi
- 6th Asia Pacific Ministerial Conference on Housing and Urban Development (APMCHUD) organized by the then Ministry of Housing & Urban Poverty Alleviation at New Delhi from 14th -16th December, 2016

II SEMINARS/ CONFERENCES/ WORKHOPS/TRAINING PROGRAMMES etc.

- Workshop on Road map for Resource Efficient Walling Materials organized by Greentech Knowledge Solutions Pvt. Ltd. on 7th June, 2016 at New Delhi.



Visit of VVIPs to the BMTPC Display at Global Bamboo Summit organized by Madhya Pradesh State Bamboo Mission (MPSBM) & Indian Federation of Green Energy (IFGE) from April 8-10, 2016 at Indore (MP)



Alternate Housing Technologies being display through Models during 6th Asia Pacific Ministerial Conference on Housing and Urban Development (APMCHUD) organized by Ministry of Housing & Urban Poverty Alleviation at New Delhi from December 14-16, 2016

-
- Workshop under Pradhan Mantri Awas Yojana: Housing for All (Urban) for Eastern Region on 15th June, 2016 at Kolkata, West Bengal.
 - One-day workshop on ‘Human Settlements’ Planning and Design: A Shared Understanding on 24th June 2016 New Delhi.
 - One-day National Conference on Deen Dayal Antodaya Yojna – National Urban Livelihoods Mission (DAY-NULM) on 27th June, 2016 at New Delhi.
 - Workshop under Pradhan Mantri Awas Yojana: Housing for All (Urban) for North Eastern Region on 15th-16th July, 2016 at Guwahati, Assam.
 - Consultation on “Shallow Masonry Domes - Alternative Traditions in Roofing Systems” jointly with Hunnarshala Foundation on 21st July, 2016 at New Delhi.
 - Training programme for professionals of Madhya Pradesh Housing and Infrastructure Board on the theme “Planning, Technology and Project Management” organized by HSMI during 31st August-02nd September, 2016 at New Delhi.
 - Programme on “Sustainable Social Housing and Scope of New Building Materials” organized by Development Alternatives on 21st September, 2016 at New Delhi.
 - National Workshop on “Utilisation of Construction & Demolition (C&D) Waste in Construction of Dwelling Units & related Infrastructures” jointly with C-FARM, New Delhi on 23rd September, 2016 at New Delhi.
 - One-day Sensitization Programme on Good Construction Practices including Emerging Housing Technologies on 26th-27th September, 2016 at Dehradun, Uttarakhand.
 - World Habitat Day Celebration on the theme “Housing at the Centre” on 03rd October, 2016 at New Delhi.
 - Training Programme for Engineers on “Earthquake Resistant constructions organized by BMTPC jointly with Aizawal Municipal Corporation and Geo-Hazards International on 17th-19th October, 2016 at Aizawal, Mizoram.

- International Training Programme on “Formal Solutions to Informal settlements” organized by HSMI on 22nd October, 2016 at New Delhi.
- National Seminar on “Sustainable Building Materials & Construction Technologies for Housing” on 26th October, 2016 at New Delhi.
- Leadership Development Programme for Chairmen/ / Directors of Housing Cooperatives” organized National Cooperative Housing Federation (NCHF) on 2nd-4th November, 2016 at New Delhi.
- Asian Ministerial Conference on Disaster Risk Reduction, 2016 (AMCDRR) during 3rd to 5th November, 2016 at New Delhi.
- In-service Training Programme on Smart Cities by HUDCO’s HSMI for IAS and IPS Officers on 8th November, 2016 at IHC, New Delhi.
- India International Trade Fair 2016 from 14-27 November, 2016 at Pragati Maidan, New Delhi.
- National Seminar on Emerging Building Materials and Construction Technologies on 18th November, 2016 at New Delhi.
- Training programme for HUDCO Officers on “Emerging Prospects of Sustainable Development Goals & Climate Change” organized by HSMI on 22nd-23rd November, 2016 at New Delhi.
- Training Programme on “Earthquake Resistant Disaster and Construction” jointly with IIT Roorkee on 8th–10th December, 2016 at New Delhi.
- 6th Asia Pacific Ministerial Conference on Housing and Urban Development (APMCHUD) organized by the then Ministry of Housing & Urban Poverty Alleviation on 14th-16th December, 2016 at New Delhi.
- Workshop on Good Engineering Practices in Construction for ULB/State engineers & construction professionals in North Eastern areas (prone to earthquakes and landslides) and Experience sharing on Pradhan Mantri Awas Yojana PMAY-HFA (Urban) for North Eastern States on 20th-21st January, 2017 at Agartala, Tripura.

- Workshop on “Prefab Housing Construction Technologies under PMAY” organized by Hindustan Prefab Limited on 2nd February, 2017 at Ranchi.
- International Conference on “Sustainable Built Environment (SBE 2017)” organised by IIT-Roorkee on 03rd – 05th February, 2017 at Roorkee.
- State Level Sensitization Programme on “Good Construction Practices and Emerging Technologies” for Housing on 9th February, 2017 at Gandhinagar, Gujarat.
- One-day Sensitization Program on Good Construction Practices and Disaster-Resistant Aspects under Housing for All on 13th February, 2017 at Bihar Sharif, Bihar.
- Sensitization Programme on “Good Construction Practices, Appropriate and Emerging Technologies for Housing” for Engineers, Architects, Planners & related professionals of UT on 23rd-24th February, 2017 at Port Blair, Andaman and Nicobar Islands.
- Seminar on “Energy Efficiency in Housing & Implementation Framework on ECBC” organized by HSML in association with the then M/o HUPA, GoI on 27th-28th February, 2017 at New Delhi.

III TECHNICAL COMMITTEE/ WORKING GROUPS /MEETINGS ETC.

- Meeting on Implementation of New Technologies in Construction Project with MES officers from all around India on 1st April, 2016 at New Delhi.
- Meeting on Implementation of New Technologies in Construction Project with MES officers on 8th April, 2016 at New Delhi.
- Meeting to review the status of Implementation of the Committee on ‘Catalyzing the Market for Affordable Housing’ chaired by the then Secretary (HUPA) on 19th April, 2016 at New Delhi.
- 8th CSMC meeting of PMAY(U) on 28th April, 2016 at New Delhi.
- 3rd Meeting of the ‘Technology Sub-Mission under the chairmanship of Joint Secretary (Housing) on 29th April, 2016 at New Delhi.

- 49th Executive Committee meeting chaired by the then Secretary (HUPA) on 13th May, 2016 at New Delhi.
- Meeting of Annual Conference of Relief Commissioner / Secretaries department of Disaster Management of States / UTs to review the status of preparedness on 18th May, 2016 at New Delhi.
- Meeting of 'Action taken on the decision of earlier CSMCs relating to PMAY (Urban) under the chairpersonship of the then Secretary (HUPA) on 24th May, 2016 at New Delhi.
- Meeting on Prefab Housing Construction among Stakeholders in support of Mission of HFA by 2022 chaired by Joint Secretary (Housing) on 27th May, 2016 at New Delhi.
- Meeting of Technical Committee on Institutionalization of the process of safety audit of hospital in Delhi / NCR on 31st May, 2016.
- 3rd Meeting of Hindi Rajbhasha Nirikshan on 14th June, 2016 at New Delhi.
- Meeting with CPWD officers on use of New Emerging Housing Technologies on 11th July, 2016 at New Delhi.
- Meeting of RC of SERC at Chennai on 21st & 22nd July, 2016.
- Visiting as a Member of Delegation of the then MoHUPA to participate in the third Session of the Preparatory Committee (PrepCom3) of Habitat III held in Surabaya, Indonesia from 25th-27th July, 2016.
- Meeting regarding Modules of the online Training Course under 'Awareness creation and capacity building on New Technologies as part of Catalyzing the market for Affordable Housing' on 1st August, 2016 at New Delhi.
- Meeting regarding Engagement of Consultant for purchasing a white paper on Prefab Housing Sector on 2nd August, 2016 at HPL, New Delhi.

- Meeting on Modules of the online Training Course under ‘Awareness creation and capacity building on New Technologies as part of Catalyzing the market for Affordable Housing’ under the Chairpersonship of the then Secretary (HUPA) on 9th August, 2016 at New Delhi.
- 12th Construction Skill Development Council of India Governing Council 3rd Annual General Meeting on 10th August, 2016 at New Delhi.
- Meeting of Governing Committee for Asia Pacific Ministerial Conference on Housing and Urban Development (APMCHUD) chaired by Joint Secretary (Housing) on 10th August, 2016 at New Delhi.
- Meeting of Open House Discussion Relating to Technology Sub-Mission under Housing for All (Urban) Mission on 12th August, 2016 at New Delhi.
- Meeting to discuss the National Building Code 2016 chaired by the then Secretary (HUPA) on 12th August, 2016 at New Delhi.
- Meeting on ‘Demonstration Housing Project, Nellore, Andhra Pradesh to see the overall project progress and make necessary logistic arrangement for inauguration the site on 16th-17th August, 2016 at Nellore.
- Review Meeting under the chairmanship of the then Hon’ble Minister (UD and HUPA) on 23rd August, 2016 at New Delhi.
- Meeting on “India in the Global Economy” on 26th August, 2016 at New Delhi.
- Meeting at Vijaywada to see the manufacturing plant to ensure the quality of panels before supply to the site on 13th September, 2016.
- Meeting towards “Making India Disaster Resilient on 28th September, 2016 at New Delhi.
- Meeting organized by Committee for Asia Pacific Ministerial Conference on Housing & Urban Development (APMCHUD) held under the Chairmanship of Joint Secretary (Housing) on 30th September, 2016 at New Delhi.

- Inauguration function of HPL Technology Park on 05th October, 2016 at Jangpura, New Delhi.
- 50th Executive Committee meeting of BMTPC chaired by the then Secretary (HUPA) on 6th October, 2016 at New Delhi.
- 12th Board of Management (BOM) meeting of BMTPC on 21st December, 2016 at New Delhi.
- Meeting of the Committee constituted by CPWD to bring out improvement in Border Out Posts (BOPs) through Innovative technologies promoted by BMTPC on December 29, 2016 at New Delhi.
- Review Meeting chaired by the then Joint Secretary (Housing), MoHUPA on 8th February, 2017 at New Delhi.
- Meeting with the Government of Uttarakhand regarding the use of New Technologies for affordable housing jointly with WAPCOS Limited, Government of India on 16th February, 2017.
- Meeting of Examination of Demand of Grants for the year 2017-18 on 21st February, 2017 at New Delhi.

ANNEXURE II**PAPERS PRESENTED/PUBLISHED INCLUDING PRESENTATIONS MADE**

- Presentation on “New Emerging Housing Technologies” to MES officers from all around India on 1st April, 2016 at New Delhi.
- Presentation on “Emerging Technologies for Mass Housing” in the Regional Workshop under Pradhan Mantri Awas Yojana: Housing for All (Urban) for Eastern Region on 15th June, 2016 at Kolkata, West Bengal.
- Presentation on “New Emerging Housing Technologies” to CPWD officers on the occasion of CPWD Day on 11th July, 2016 at New Delhi.
- Presentation on “Emerging Technologies for Mass Housing” in the Regional Workshop under Pradhan Mantri Awas Yojana: Housing for All (Urban) for North Eastern Region on 15th-16th July, 2016 at Guwahati, Assam.
- Presentation on “New Emerging Housing Technologies” during 13th National Convention of NAREDCO on 19th August, 2016 at New Delhi.
- Presentation on “Innovative Products for Housing to All” in the training programme for professionals of Madhya Pradesh Housing and Infrastructure Board on the theme “Planning, Technology and Project Management” organized by HSMI on 31st August-02nd September, 2016 at New Delhi.
- Presentation on “Alternate Building Materials & Products : Need to Reuse & Recycle Waste” during Workshop on Utilization of Construction & Demolition (C&D) Waste in construction of Dwelling Units & related Infrastructures on 13th September, 2016 at New Delhi.
- Presentation on “BMTPC activities & Sustainability Aspects of Housing for All Mission” in the programme “Sustainable Social Housing and scope of New Building Materials” organized by Development Alternatives on 21st September, 2016 at New Delhi.
- Presentation on “New Emerging Housing Technologies” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 27th September, 2016 at Dehradun.

- Presentation on “Earthquake Resistant Design & Construction Practices” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 27th September, 2016 at Dehradun.
- Paper entitled “New Construction System for PMAY” published in the Special Issue of Nirman Sarika on the theme of World Habitat Day “Housing at the Centre”, October, 2016, New Delhi.
- Presentation on “Emerging Mass Construction Technological Alternatives for Construction of Affordable & Sustainable Housing” in the International Training Programme on “Formal solutions to Informal settlements” organized by HSMI on 22nd October, 2016 at New Delhi.
- “Leadership Development Programme for Chairmen/ / Directors of Housing Cooperatives” organized National Cooperative Housing Federation (NCHF) on 2nd-4th November, 2016 at New Delhi.
- Presentation on “Fast Construction Technologies for Mass Housing” during 5th All India Police Housing Conference on 16th November, 2016 at Bhopal.
- Presentation on “New & Emerging Technologies for housing” in the training programme for HUDCO Officers on “Emerging Prospects of Sustainable Development Goals & Climate Change” organized by HSMI on 22nd-23rd November, 2016 at New Delhi.
- Presentation on “Emerging Construction Systems for Mass Housing” during UGC – HRDC Refresher Course on Built Environment & Sustainable Technologies (BEST) organized by Jadavpur University on 7th January, 2017 at Kolkata.
- Presentation on “Sustainable Building Materials & Construction Technologies” during UGC – HRDC Refresher Course on Built Environment & Sustainable Technologies (BEST) organized by Jadavpur University on 7th January, 2017 at Kolkata.
- Presentation on “Earthquake Resistant Design & Construction Practices” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 19th January, 2017 at Tripura.

- Presentation on New Technologies for Mass Housing in Awareness Workshop on “Prefab Housing Construction Technologies under PMAY” organized by Hindustan Prefab Limited on 2nd February, 2017 at Ranchi.
- Presentation on “Earthquake Resistant Design & Construction Practices” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 9th January, 2017 at Gandhinagar, Gujarat.
- Presentation on “Emerging Construction Systems for Mass Housing” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 23rd February, 2017 at Port Blair, A&N Islands.
- Presentation on “Sustainable Building Materials & Construction Technologies” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 23rd February, 2017 at Port Blair, A&N Islands.
- Presentation on “Earthquake Resistant Design & Construction Practices” during Sensitization Programme on “Good Construction Practices including Emerging Technologies for Housing” on 23rd February, 2017 at Port Blair, A&N Islands.
- Presentation on “Energy Efficient Construction Technologies” in the Seminar on “Energy Efficiency in Housing & Implementation Framework on ECBC” organized by HSMI in association with the then M/o HUPA, Gol on 27th-28th February, 2017 at New Delhi.
- Presentation on “Emerging Construction Systems for Mass Housing” before Directorate General, CRPF, New Delhi on 02nd March, 2017.
- Presentation on “Bamboo based Technologies for Housing Construction in the North Eastern Region” during Training Programme on “Bamboo based Technologies for Building Construction” on 25th March, 2017 at Guwahati, Assam.

PUBLICATIONS BROUGHT OUT DURING THE YEAR

1. Special Issue of Newsletter “Nirman Sarika” on the theme of the World Habitat Day “Housing at the Centre”
2. Guidebook on Earthquake Resistant Design and Construction
3. Pocket book on Emerging Construction Systems
4. Margdarshika for Masons – Rajmistry ke liye Dishanirdesh (in Hindi)
5. Guidelines for Utilization of Construction & Demolition (C&D) Waste in Construction of Dwelling Units & related Infrastructures
6. Earthquake Hazard Zoning Atlas of India
7. Earthquake Hazard Zoning Atlas of each States/UTs (36 nos.)



Building Materials and Technology Promotion Council

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