THE 10th GRIHA SUMMIT-2018

13th Dec., 2018, The Ashok, New Delhi

Sustainable Re-emerging Modified Cost Effective Building Technologies

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## 6 Principles applicable for affordable sustainable housing

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Siting, Form &amp; Design:</strong> Building orientation, massing, volume, building form, natural ventilation, day lighting &amp; open spaces.</td>
</tr>
<tr>
<td>2</td>
<td><strong>External development &amp; landscape</strong> Hardscape &amp; softscape, noise mitigation, vegetation w.r.t. shadows, heat island effect, parking, ecology, biodiversity, water conservation, pedestrian access, lighting &amp; Signages</td>
</tr>
<tr>
<td>3</td>
<td><strong>Envelop Optimization</strong> Performance oriented components of building - walls, roof, fenestration, floor &amp; surface finishes.</td>
</tr>
</tbody>
</table>
| 4 | **Materials** ✓ Structural & finishing materials  
✓ Locally available material  
✓ Recycled, renewable & indigenous |
| 5 | **Building services optimization** ✓ Climatic responsive design for reduction in heating, cooling & lighting loads  
✓ Conservation practices  
✓ Renewable energy utilization |
| 6 | **Construction practices** ✓ Preconstruction requisites  
✓ Construction management  
✓ Monitoring & control of environment concerns  
✓ Effective use of water  
✓ Waste management  
✓ Sustainable Construction Methodology  
✓ Disaster risk mitigation during construction |
Guiding Principles For Sustainable Living

Sustainability is part of our DNA

(3-M) Three attributes for Sustainable Living:

- Minimum possession
- Minimum consumption
- Minimum wastage

These attributes are also applicable for Sustainable Building
Why Alternative Technologies?

ISSUES

- The climate change
- The carbon footprint
- The energy conservation
- Quality product

- The environment
- National resources
- Cost effective & affordability
- Semi automatic & mechanisation

Become key factors demanding change in:

(i) Methodologies of planning & construction and

(ii) Exploration of New Innovative Green Materials & Technologies

“MADE IN INDIA”

Technologies for Sustainable Housing
Our Ancient Indus Civilization is The Learning Tool of Technology

Indian heritage technologies are temples of modern India.

Many Ancient Buildings and Monuments are classic examples of sustainable buildings

“MADE IN INDIA”

Technologies for Sustainable Housing
Based on ancient example of sustainable buildings “Made in India”

FOR ROOFING:
- R.C. Ribbed Slab
- Precast Channel Roofing
- Precast RC Plank Roofing
- Precast RC Ferrocement Panel Roofing
- Precast RC Hollow Slab Roofing
- Cast-in-Situ Hollow Slab Roofing
- R.B. Filler Slab Roofing
- R.B.C. Roofing
- Precast R.B. Panel Roofing
- Precast R.B. Arched Panel Roofing
- CRF Sections and Ferrocement Panel Roofing
- Precast Ferrocement Segmental Shells Roofing
- Precast RC panel roofing
- Funicular shell roofing

SHEAR WALL TECHNOLOGY

OTHER COMPONENTS:
- Precast Ferrocement Cupboard & Kitchen Shelves
- Precast Ferrocement Sunshades
- Precast R.C. Lintels
- R.B.C. Lintels
- Precast Ferrocement steps
- Precast concrete door & window frames
- Ferrocement water tanks
- RCC monolithic technology
- Precast elements such as
  - Lintels,
  - Sunshades,
  - Kitchen slabs,
  - Water tanks,
  - Stair case steps,
  - Drains and chambers,
- Under reamed piles (for load bearing walls)
- Interlocking pavers
- CRF beams

FOR WALLING:
- Rowlock bond (Rat – trap bond),
- Stretcher bond,
- Hollow concrete blocks,
- Interlocking mortar less block walking,
- Perforated mechanized modular bricks,
- FAL-G modular bricks,
- Stone block masonry.
- AAC blocks (in multistoried)
- Cement Flyash mortar
Based on principles of sustainability, Partial small prefab technologies with conventional materials were developed:

### For Ease

- Ease in casting
- Ease of erection
- Ease in understanding by masons
- Ease in understanding by small contractors

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**“MADE IN INDIA”**

Technologies for Sustainable Housing
Re-emerging modified cost effective technologies

Stage 2 : Prefabrication and Mechanization

(After 5 Decades of R&D and Implementation on ground)

- Technologies have been modified
- Mechanisation introduced
- Assured better quality control
- Systems are simplified for ease of construction
- Negligible Capital Investment
- D I Y (Do it yourself) methodologies
- Assured cost effectiveness
- Assured faster construction
But, why are we afraid of New Materials & Technologies?
Why we copy West?

Recognise & motivate our own technocrats.

We have enough brain to develop “Made in India” and “Made for India” technologies.

Which are cost-effective-green-sustainable.

Save foreign exchange - motivate

Develop new entrepreneurs – Create jobs
The Development of Appropriate Technologies for Quality - Affordable – Housing

have to pass through various stages of improvement:

- Production process
- Execution process
- Quality control
- Cost reduction
- Durability
- Safety
- Ease in implementation
- Acceptance by community

Continuous R&D is the key factor for sustainability of technologies

“MADE IN INDIA”

Technologies for Sustainable Housing
However successful Promotion & Adoption of New Technologies require

Enough time to prove durability and advantages to existing one

Sometimes

It takes decades, before they are widely accepted

Although several examples of housing projects with new materials & technologies exist in few cities, however, they are not the “norms”
Why we don’t see this

Because

Construction is a “System” with following parameters:

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Conventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td>Aesthetic</td>
</tr>
<tr>
<td>Contracting norms</td>
<td>Tastes</td>
</tr>
<tr>
<td>Financing</td>
<td>Safety norms &amp; related perceptions</td>
</tr>
<tr>
<td>Performance measures</td>
<td>Longevity</td>
</tr>
<tr>
<td>Standards</td>
<td></td>
</tr>
</tbody>
</table>
## Cost Effective On-site Modified Re-emerging Technologies

### Stage 2 : Prefabrication and Mechanization

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Alternative Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td><strong>Foundation</strong></td>
</tr>
<tr>
<td></td>
<td>MRe - 1 Flyash-concrete-stone block masonry</td>
</tr>
<tr>
<td>B.</td>
<td><strong>Walls</strong></td>
</tr>
<tr>
<td></td>
<td>MRe - 2 (Modular 200mm) Load bearing flyash bricks system</td>
</tr>
<tr>
<td></td>
<td>MRe - 3 (Modular 200mm) Load bearing REB (mechanised) system</td>
</tr>
<tr>
<td></td>
<td>MRe - 4 Load bearing interlocking mortarless block system</td>
</tr>
<tr>
<td></td>
<td>MRe - 5 190mm load bearing stretcher bond system</td>
</tr>
<tr>
<td></td>
<td>MRe - 6 Load bearing modified RHCM system</td>
</tr>
<tr>
<td></td>
<td>MRe - 7 Row-lock bond walling system</td>
</tr>
<tr>
<td></td>
<td>MRe - 8 AAC/ CLC block wall wall system</td>
</tr>
<tr>
<td>C.</td>
<td><strong>Floor / Roofing</strong></td>
</tr>
<tr>
<td></td>
<td>MRe - 9 Mechanised RC ribbed slab system</td>
</tr>
<tr>
<td></td>
<td>MRe - 10 Mechanised RC planks &amp; joists system</td>
</tr>
<tr>
<td></td>
<td>MRe - 11 Mechanised ferro-crete small panel system</td>
</tr>
<tr>
<td></td>
<td>MRe - 12 Mechanised precast hollow slab (kular) system</td>
</tr>
<tr>
<td></td>
<td>MRe - 13 Mechanised precast RB panel system</td>
</tr>
<tr>
<td>S.N.</td>
<td>Alternative Technologies</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>MRe - 14</td>
<td>Modified D.C. shell system</td>
</tr>
<tr>
<td>MRe - 15</td>
<td>Precast ferrocement shell system</td>
</tr>
<tr>
<td>MRe - 16</td>
<td>Precast ferrocrete channel system</td>
</tr>
<tr>
<td><strong>D. Door / Window frames</strong></td>
<td></td>
</tr>
<tr>
<td>MRe - 17</td>
<td>Precast R.C.</td>
</tr>
<tr>
<td><strong>E. Sunshades</strong></td>
<td></td>
</tr>
<tr>
<td>MRe - 18</td>
<td>Precast ferrocement</td>
</tr>
<tr>
<td><strong>F. Staircase</strong></td>
<td></td>
</tr>
<tr>
<td>MRe - 19</td>
<td>Steps (Tread / Riser) precast ferrocement</td>
</tr>
<tr>
<td><strong>G. Kitchen platform &amp; Other shades</strong></td>
<td></td>
</tr>
<tr>
<td>MRe - 20</td>
<td>Precast ferrocement</td>
</tr>
<tr>
<td><strong>H. External finishing</strong></td>
<td></td>
</tr>
<tr>
<td>MRe - 21</td>
<td>Exposed with water repellent silicon coat</td>
</tr>
<tr>
<td><strong>I. Vernacular technologies</strong></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Savings in Cost</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Foundations</td>
<td>10%</td>
</tr>
<tr>
<td>Walls</td>
<td>20%</td>
</tr>
<tr>
<td>Intermediate floors &amp; roof</td>
<td>21%</td>
</tr>
<tr>
<td>Stair case</td>
<td>30%</td>
</tr>
<tr>
<td>Sunshades Cum Lintels</td>
<td>25%</td>
</tr>
<tr>
<td>Kitchen Platforms</td>
<td>30%</td>
</tr>
<tr>
<td>Water Tanks</td>
<td>20%</td>
</tr>
<tr>
<td>D/W Frames</td>
<td>30%</td>
</tr>
<tr>
<td>Roofing System :-</td>
<td>Walling System :-</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>RC planks casting machines 7 Nos @ 1,00,000</td>
<td>Block Making Machines</td>
</tr>
<tr>
<td>= 7.00 lacs</td>
<td>FOB Price = 2,16,00,000</td>
</tr>
<tr>
<td>Twin moulds 14 Nos @ 20000</td>
<td>Insurance, Freight, duties 26% = 25,92,000</td>
</tr>
<tr>
<td>= 2.80 lacs</td>
<td>CIF Price = 3,04,81,920</td>
</tr>
<tr>
<td>Pellets 700 Nos @ 1000</td>
<td>Batching Plant (indigenous) = 50,00,000</td>
</tr>
<tr>
<td>= 7.00 lacs</td>
<td>Total = 3,54,81,920</td>
</tr>
<tr>
<td>MS Channels for Joists 70 Nos. @ 2500</td>
<td>Amortised Cost of Equipment (For 30 months project) = 1,26,72,115</td>
</tr>
<tr>
<td>= 1.75 lacs</td>
<td>Residual value of equipment (For future use) = 2,28,09,305</td>
</tr>
<tr>
<td>MS Angles for Steps, Sunshades, Shelves</td>
<td>Total = 20.05 lacs</td>
</tr>
<tr>
<td>= 0.50 lacs</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong> = 20.05 lacs</td>
<td><strong>Total</strong> = 30.05 lacs</td>
</tr>
<tr>
<td>Open platform (20,000 sft) &amp; Temporary shed (10,000 sft)</td>
<td>Cost of Mechanisation (Per Sft.) - Rs. 11.50</td>
</tr>
<tr>
<td>= 10.00 lacs</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong> = 30.05 lacs</td>
<td></td>
</tr>
<tr>
<td>Cost of mechanisation (Per Sft.) = Rs. 1.50</td>
<td></td>
</tr>
</tbody>
</table>

**Total Cost of Mechanisation (1.50 + 11.50 + 0.25) = Rs.13.25 per sft**
## Affordability In Technology

**Savings in time**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Description</th>
<th>Conventional</th>
<th>Cost effective Proposal</th>
<th>Time period for block of 16 D.U.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Foundation</td>
<td>6 days</td>
<td>6 days</td>
<td>6 days</td>
</tr>
<tr>
<td>2.</td>
<td>Superstructure: Casting of column, beams, slabs including shuttering, placing reinforcement, casting and removal of form work (each floor)</td>
<td>4 x16 = 64 days</td>
<td>5 days (each floor) (precast slab)</td>
<td>4 x 5 = 20 days</td>
</tr>
<tr>
<td>3.</td>
<td>Raising walls and Door / Window frames (each floor)</td>
<td>4 x 3 = 12 days</td>
<td>4 days (including lintel band)</td>
<td>4 x 4 = 16 days</td>
</tr>
<tr>
<td>4.</td>
<td>Internal plastering (each floor)</td>
<td>4 x 2 = 8 days</td>
<td>No ceiling &amp; wall plaster</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>External plastering (each floor)</td>
<td>4 x 3 = 12 days</td>
<td>No Ext. plaster (POP only)</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Flooring (each floor)</td>
<td>4 x 1 = 4 days</td>
<td>1 day</td>
<td>4 x 1 = 4 days</td>
</tr>
<tr>
<td>7.</td>
<td>Plumbing &amp; Elec. (each floor)</td>
<td>4 x 5 = 20 days</td>
<td>5 days</td>
<td>4 x 5 = 20 days</td>
</tr>
<tr>
<td>8.</td>
<td>D/W shutters &amp; Painting (each Floor)</td>
<td>4 x 1 = 4 days</td>
<td>1 day</td>
<td>4 x 1 = 4 days</td>
</tr>
<tr>
<td></td>
<td><strong>One Block of 16 Dwelling Units</strong></td>
<td><strong>130 days</strong></td>
<td></td>
<td><strong>70 days</strong></td>
</tr>
</tbody>
</table>
Affordability In Technology
Savings in Energy

✓ Reduction in consumption of resource materials
  o Bricks / Blocks
  o Concrete
  o Cement
  o Sand
  o Steel reinforcement

✓ Less consumption means saving of embodied energy

✓ Elimination of ceiling plaster

✓ Almost no external plaster / form work

✓ Reduction in internal wall plaster

✓ Provide better insulation

✓ On site production – Saves fuel on transportation

✓ Low maintenance

✓ Low energy light equipments required

✓ Elimination or reduction in form work
Affordability In Technology
Savings in Water Consumption

✓ Reduced water consumption during construction – due to less volume of masonry, concrete, no ceiling plaster, no external plaster.

✓ The precast slab panels, stairs, sunshades, shelves (thin elements) are cured with spray of water.

✓ The mechanised & high strength blocks, have high compressive strength and low water absorption.

✓ Ferrocement elements being thin elements – consume less water.

✓ Hardy plants species which require less water (Acacia Arabica, Baryan, Pelpal, Ashok, Cedar etc.)
Onsite Prefab Elements Affordable - Machines

* Doesn’t require “Skilled” labour,  
But require “Training”

Alternate Station Hydraulic Brick Press

Bi-Directional Vibro Press

Stationary Block Machine

Concrete Block Machine

Solid/Hollow Concrete Block Machine (Egg laying Type)

Solid/Hollow Concrete Block Machine (Standing Type)

Cement mortar mixer spray plaster machine

Source : BMTPC & Other manufacturers
Onsite Prefab Elements Affordable - Machines

- Solid/Hollow Concrete Block Machine (Handheld Type)
- Compressed Earth Block Machine (Hydraform)
- Ferrocement Roofing Channel Machine
- Ferrocement Wall Panel Machine
- Compressed Earth Block Machine
- TNG Rural Housing Kit

Source: BMTPC & Other manufacturers

* Doesn’t require “Skilled” labour, But require “Training”
Onsite Prefab Elements Affordable - Machines

* Doesn’t require “Skilled” labour, But require “Training”

Source: BMTPC & Other manufacturers
Onsite Prefab Elements Affordable - Machines

- Terrazo/ Chequered Tile Machine
- Precast concrete Door/ Window Frame Machine
- Combination Machine
- Stone/Coal Disintegrator
- Bar and Pipe Cutting Machine
- Multipurpose Stone Processing Machine

* Doesn’t require “Skilled” labour,
But require “Training”

Source: BMTPC & Other manufacturers
Re-emerging modified cost effective technologies

The Past & Present
EWS HOUSING - YEAR 2006
RAJIV GANDHI HOUSING, BAWANA - 3164 HOUSES

TECHNOLOGIES

Roofing
- Precast RC planks & joists roofing
- Precast ferrocement elements

Walling
- Perforated mechanized modular bricks
- FAL-G modular bricks

Other Components
- Single stack system of plumbing

Re-emerging modified cost effective technologies
Re-emerging modified cost effective technologies

**EWS HOUSING - YEAR 2008**
**BAWANA, DELHI -1184 HOUSES**

**TECHNOLOGIES**

- Modular perforated Brick Walls
- Precast RC Planks & Joists Slab
- Precast Ferrocement Elements
Re-emerging modified cost effective technologies

EWS HOUSING - YEAR 2006
NARELA, DELHI - 1892 HOUSES

TECHNOLOGIES

• Modular perforated Brick Walls
• Precast RC Planks & Joists Slab
• Precast Ferrocement Elements
Re-emerging modified cost effective technologies

EWS HOUSING - YEAR 2009
NARELA (NEAR CETP), DELHI, 1652 HOUSES

TECHNOLOGIES
• Modular perforated Brick Walls
• Precast RC Planks & Joists Slab
• Precast Ferrocement Elements

The Past & Present
Re-emerging modified cost effective technologies

HOUSING FOR URBAN POOR – YEAR 2011
BHORGARH, DELHI, 1272 HOUSES

TECHNOLOGIES

• Modular perforated Brick Walls
• Precast RC Planks & Joists Slab
• Precast Ferrocement Elements
Re-emerging modified cost effective technologies

EWS HOUSING - YEAR 2010
BAPROLA, DELHI, 5568 HOUSES

TECHNOLOGIES

• Modular perforated Brick Walls
• Precast RC Planks & Joists Slab
• Precast Ferrocement Elements
Re-emerging modified cost effective technologies

**EWS HOUSING - YEAR 2008**
**BAWANA, DELHI – 896 HOUSES**

**TECHNOLOGIES**
Monolithic technology
Re-emerging modified cost effective technologies

EWS HOUSING – YEAR 2016
BAKARWALA, DELHI – 240 HOUSES

TECHNOLOGIES

• Mechanized bricks
• Flyash bricks
• Precast R.C. Planks and Joists Roof
Sustainable Affordable Housing

Re-emerging modified cost effective technologies

EWS HOUSING
POOTHKHURD, DELHI - 10140 HOUSES

TECHNOLOGIES

- RC Planks & Joists
  Roof In framed structure
- Flyash brick walls

The Past & Present
Re-emerging modified cost effective technologies

EWS HOUSING
KALKAJI, DELHI - 3024 HOUSES

Google View

TECHNOLOGIES
• Waling - CLC Blocks
Re-emerging modified cost effective technologies

EWS HOUSING
FARIDABAD & PALWAL (ERA GROUP) - 578 HOUSES

TECHNOLOGIES
• Modular perforated bricks
• Precast RC Planks & Joists Roof

Era Adel Divine, Era Divine Court, Era Redwood Residency
Re-emerging modified cost effective technologies

EWS HOUSING
SUSHANT GOLF CITY, LUCKNOW
2750 HOUSES

TECHNOLOGY :- Monolithic RCC
Re-emerging modified cost effective technologies

EWS HOUSING
ASHRRAY, SULABH AWSAS YOJANA, LUCKNOW
4500 HOUSES
Re-emerging modified cost effective technologies

EWS HOUSING - YEAR 2009
GHOGHA, DELHI – 3680 HOUSES

TECHNOLOGY :- Monolithic RCC
Re-emerging modified cost effective technologies

EWS HOUSING - ONGOING
TIKRI KALA, DELHI – 4560 HOUSES

TECHNOLOGIES

• RC Planks & Joists Roof In framed structure
• Flyash brick walls
Re-emerging modified cost effective technologies

EWS HOUSING - YEAR 2013
BAWANA, DELHI – 704 HOUSES

TECHNOLOGY
Monolithic Technology
Re-emerging modified cost effective technologies

**EWS HOUSING - YEAR 2010**
OMICRON, GREATER NOIDA, 1848 HOUSES

TECHNOLOGIES

- Modular perforated Brick Walls
- Precast RC Planks & Joists Slab
- Precast Ferrocement Elements
Re-emerging modified cost effective technologies

LIG AFFORDABLE HOUSING
GREATER NOIDA - 800 HOUSES

TECHNOLOGIES
Walls: Rat Trap Bond

Cassia Estate
Gulmohar Estate
Re-emerging modified cost effective technologies

AFFORDABLE HOUSING - ONGOING
DELHI POLICE HOUSING, DHEERPUR, DELHI - 5202

TECHNOLOGY
Projects using Monolithic Technology
Re-emerging modified cost effective technologies

AFFORDABLE HOUSING - YEAR 2013
INNO GEOCITY, CHENNAI - 500 HOUSES

TECHNOLOGIES
- Hydraform interlocking block walls
- Precast RC Planks & Joists Roof
- Stone Block masonry in foundation
- Precast Boundary wall
Re-emerging modified cost effective technologies

WORKER’S HOUSING
ANJAR & VAPI, GUJRAT – 669 Houses

TECHNOLOGIES

• Hydraform interlocking block walls
• Precast RC Planks & Joists Roof
• Precast sunshade, Ferrocement staircase
• Concrete Block masonry in foundation
• Precast Boundary wall
Re-emerging modified cost effective technologies

AFFORDABLE CORPORATE STAFF HOUSING - YEAR 1992

TECHNOLOGIES
• Filler slab

DAURALA ORGANICS LTD. U.P.

TECHNOLOGIES
• 190 mm wall stretcher bond
• Precast ferrocement panel slabs

DAURALA SUGAR LTD. U.P.
Re-emerging modified cost effective technologies

AFFORDABLE CORPORATE STAFF HOUSING - YEAR 1992
MAWANA SUGAR WORKS

TECHNOLOGIES

ROOFING:
- Precast RB Panel
- RC Panel
- RC Ribbed slab

WALLING:
- Stretcher bond
- Rat trap bond
Re-emerging modified cost effective technologies

AFFORDABLE CORPORATE STAFF HOUSING – YEAR 1983
FOR VAM ORGANIC CHEMICALS LTD.
AT GAJRAULA, DISTT. MORADABAD, U.P. – 144 HOUSES

TECHNOLOGIES

- ROOFING: FILLER SLAB
- WALLING – LOAD BEARING WALLS (Exposed)
Re-emerging modified cost effective technologies

AFFORDABLE CORPORATE STAFF HOUSING - YEAR 1984
MODI XEROX, RAMPUR, U.P.

TECHNOLOGIES
• ROOFING: FILLER SLAB
• WALLING – LOAD BEARING WALLS (Exposed)
Re-emerging modified cost effective technologies

DEMONSTRATION HOUSE - YEAR 1976
K.K. NAGAR, CHENNAI

TECHNOLOGIES

ROOFING
- Precast hollow roofing

WALLING
- Precast RCC hollow wall
Re-emerging modified cost effective technologies

EWS HOUSING BHOPAL DEVELOPMENT AUTHORITY - YEAR 1978

TECHNOLOGIES

• Under Reamed Piles
• Stone Block Masonry
• Walls
• Precast Cast-in-situ Hollow ‘Kular’ RCC Slab
Re-emerging modified cost effective technologies

AFFORDABLE CORPORATE HOUSING - YEAR 1993
DCM TOYOTA LTD, GREATER NOIDA, U.P.

TECHNOLOGIES
• Filler slab roofing
• Stretcher bond 190mm wall
Re-emerging modified cost effective technologies

CORPORATE STAFF HOUSING

MODI FIBER CO. LTD. MODI NAGAR

TECHNOLOGIES

• Filler slab roofing
Re-emerging modified cost effective technologies

WORKER'S HOUSING FOR PUNJAB KHAND UDYOG LTD. - YEAR 1982
(PUNJAB GOVT. UNDER TAKING)
AT GURDASPUR & ZIRA – 120 HOUSES

ROOFING
• Precast RC Plank & Joists

WALLING
• stretcher bond
• Cement – Lime Plaster
Re-emerging modified cost effective technologies

DEMONSTRATION HOUSES - YEAR 2010 AMETHI, U.P.

ROOFING
- Filler slab roofing

WALLING
- Rat trap bond
Re-emerging modified cost effective technologies

POETRY IN BRICKS - YEAR 2009
MANESAR, GURGAON

VERNACULAR TECHNOLOGY
THE THREE MANTRAS OF SUCCESS IN TECHNOLOGIES

“MANTRA$^1$”

We are all players in the game of “Technology”

*It is not the skill.*

*It is the game spirit that wins the game.*

We are the “trustee” of knowledge;

But to sustain ourselves
We have to win the “Trust” of the people
and the society to whom we intend to serve

“MADE IN INDIA”

Technologies for Sustainable Housing
THE THREE MANTRAS OF SUCCESS IN TECHNOLOGIES

“MANTRA²”

The Government alone can't succeed in Technology Mission,
Only By Making Laws

It requires an overhauling of our mind set

If we can change “MOBILE” set

Why can’t we change our “MIND” set

“MADE IN INDIA”

Technologies for Sustainable Housing
THE THREE MANTRAS OF SUCCESS IN TECHNOLOGIES

“MANTRA³”

Ultimately Users Voice Is Consumers Voice

(With a Caveat)

“मकान ऐसे मत बनाओ कि लोग फसियाद करें
मकान ऐसे बनाओ कि लोग फिर याद करें”
WRONG NOTION

Who says the alternative innovative technologies are meant only for “Poor Man’s Housing.

The Green & Cost effective technologies can be used for all types of Affordable Buildings.

✓ Educational
✓ Commercial
✓ Hospitals
✓ Hotels
✓ Industrial
✓ High-end Housing
Cost Effective Alternative Technologies

KNGD Engineering College, Modinagar
Technology: Flyash Bricks, Filler Slabs, Concrete D/W Frames

Jagriti Hostel, Modi Nagar
Technology: Flyash Bricks, Filler Slabs, Concrete D/W Frames, Ferrocement Furniture, R.B.C. basement walls

Mahendra Hostel, Modi Nagar
Technology: Filler Slabs

N.C. College of Engineering, Panipat (Hostel)
Technology: Filler Slabs, Load bearing wall

Promilla College, Modi Nagar
Technology: Filler Slabs

Training Hostel, Daurala Organics Ltd.
Technology: Filler Slabs

Confidence – Acceptability – Performance (Bldgs. Other than Housing)
Cost Effective Alternative Technologies

Confidence – Acceptability – Performance (Bldgs. Other than Housing)

Community Hall, Ambala
Technology: ➢ 34 Different Alternative Technologies for walls & roofing’s

Modi Bhawan, Goverdhan
Technology: ➢ Filler Slabs

Shops cum Flats, Modi Nagar
Technology: ➢ Filler Slabs

Zenetronics, Ashok Vihar, Delhi
Technology: ➢ Precast ferrocement panel ➢ RAT Trap bond

CORPORATE OFFICE, GREATER NOIDA
INDUSTRIAL DEVELOPMENT AUTHORITY

Tala Hydro Project Authority, Gedu, Bhutan
Technology: ➢ Stone block masonry
Animal Welfare Board of India, Office & Hospital at Ballabhgarh

Technology:
- Hydraform Interlocking Blocks
- Ferrocement Roofing Systems
- Concrete D/W frames

Ginni Modi Hospital, Modinagar

Technology:
- Filler Slabs

Rimal Hospital, Ludhiana

Technology:
- Filler Slabs

Krishna Medical Centre, Lucknow

Technology:
- Filler Slabs

300 Bedded Super Specialty Hospital, Janakpuri, Delhi

Technology:
- AAC Blocks Walls
Cost Effective Alternative Technologies

Confidence – Acceptability – Performance (Bldgs. Other than Housing)

SAMRAT AT CHARBAGH, LUCKNOW

Technology: ➢ Filler Slabs

Hotel Mayur, Lucknow
Hotel Amber, Lucknow
Hotel Avadh Deep, Lucknow

Hotel KOHINOOR, LUCKNOW

Technology: ➢ Filler Slabs
➢ Basement walls in RBC
➢ Slabs Precast RCC hollow slabs with kulars
➢ Filler slabs

HOTEL AT MOSCOW

Technology:
➢ Composite steel
Concrete structure

Hotel
Hotel
Hotel
Cost Effective Alternative Technologies

Confidence – Acceptability – Performance (Bldgs. Other than Housing)

- **MADAN TRADING CO.**
  - **Technology:**
    - RC Plank System
    - Intermediate Floor
- **UNIK SURFACTANTS (P) LTD. PARTAPUR, MEERUT**
  - **Technology:**
    - RAT Trap bond walls
    - Precast RC Panel roofing
- **WELCURE DRUGS & PHARMACEUTICALS LTD. BHIWADI, RAJASTHAN**
  - **Technology:**
    - RAT Trap bond walls
    - Precast RC Panel roofing
- **GEETA FLEXCO GRAVURE P. LTD., NOIDA**
  - **Technology:**
    - RAT Trap bond walls
    - Precast RC Panel roofing
- **DAWAT RICE FACTORY, SONEPAT**
  - **Technology:**
    - RAT Trap Bond
- **BHARTI AGRITECH, P. LTD. GURGAON**
  - **Technology:**
    - RAT Trap bond walls
    - Precast RC Panel roofing
Cost Effective Alternative Technologies

Confidence – Acceptability – Performance (Bldgs. Other than Housing)

RITA ROOFING LTD.
MALANPUR, INDUST. AREA, Gwalior

TECHNOLOGY: RMP Roofing Sheets

ADITYA GEARS LTD. BHIWADI

TECHNOLOGY: RAT Trap Bond Walls
Precoat Ferrocement Roofing

SKJ BEARING (P) LTD. BHIWADI

Technology: Precast Ferrocement Roofing

TILDA RICELAND LTD. KURUKSHETRE

Technology: RAT Trap Bond, Arch.
Foundation & Precast Channel roofing
Sustainable Affordable Housing

HIGH-END HOUSING

FARM HOUSE OF SMT INDIRA GANDHI, DELHI

Technology: - Vautan light weight concrete block walls

YEAR 2009 - POETRY IN BRICKS, MANESWAR

Technology: - Vernacular Technology
Thanking You