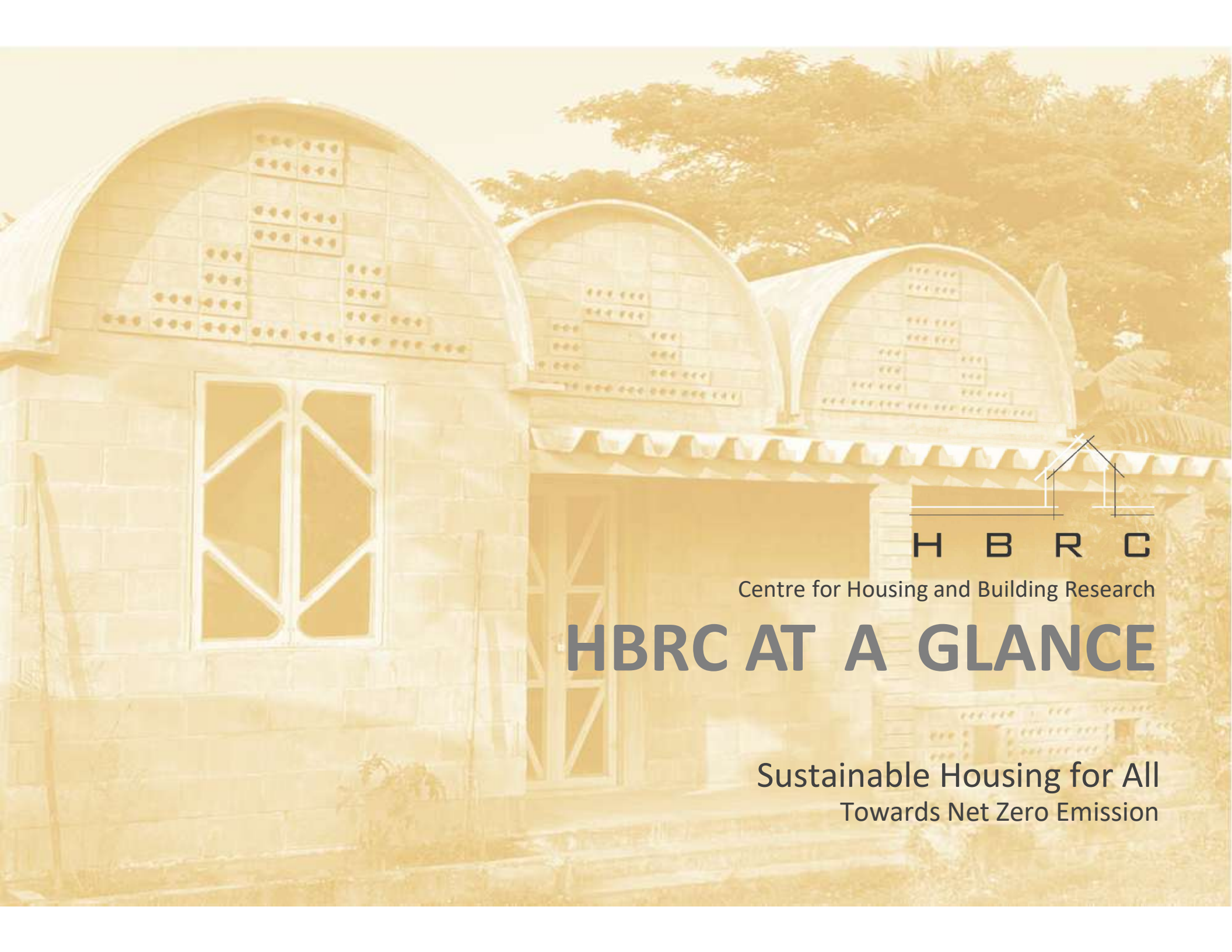




H B R C

Centre for Housing and Building Research

HBRC AT A GLANCE

Sustainable Housing for All
Towards Net Zero Emission

A faded background image showing a group of people in a meeting or workshop setting. Some individuals are seated at a table, while others are standing. The scene appears to be an outdoor or semi-outdoor environment with trees in the background.

ABOUT US

Centre for Housing and Building Research (HBRC) is a dedicated research and development hub established to complement public and private initiatives in Bangladesh's housing and construction sector. As the first of its kind in the country, HBRC envisions "Sustainable housing for all" addressing the challenges posed by disasters, environmental degradation, technological gaps, and affordability barriers. With a focus on innovation and inclusivity, HBRC aims to develop and promote affordable, sustainable, and disaster-resilient housing solutions, ensuring that the needs of common people remain at the heart of its mission. HBRC serves as an open platform for sharing and learning about new innovations and ideas that align with the Centre's vision and goals, fostering collaboration among researchers, entrepreneurs, and practitioners.



VISION:

To be a knowledge hub for green, disaster-resilient, and affordable solutions.

MISSION:

HBRC is dedicated to conducting cutting-edge research and development across all facets of housing and building technologies. We aim to support building professionals by providing innovative solutions in planning, design, materials, foundation systems, and construction techniques, with a strong focus on sustainability, environmental responsibility, and disaster risk mitigation.

WHY WE EXIST:

- To act as a facilitator for ensuring **"Sustainable Housing for All"**
- To run research for "Disaster-resilient habitation"
- To run research for "Agriculture and environment-friendly development"
- To promote "Energy-efficient and low-carbon construction technologies"
- To support policy "Advocacy and capacity building in sustainable construction"



Engr. Md. Siddique Ullah
Chief Engineer (retd), PWD



Prof. Dr. Ainun Nishat
Emeritus & Advisor
Centre for Climate Change and
Environmental Research (C3ER),
BRAC University &
Prof. of BUET (retd)



Engr. Manjurul Islam
Chief Engineer (retd), PWD

Message from the Executive Director,

It is a matter of great pride and purpose to introduce the Centre for Housing and Building Research (HBRC) — a pioneering private sector initiative, and the first of its kind in Bangladesh. As a leading research-based organization in housing and construction technologies, HBRC is driven by the commitment to integrate science, sustainability, and affordability in pursuit of the vision: ‘Sustainable Housing for All’.

Amid growing urbanization, climate vulnerabilities, and the urgent demand for safe, affordable living, our mission has become more critical than ever. HBRC is dedicated to developing innovative, research-backed solutions that promote disaster-resilient, environmentally conscious, and agro-friendly housing models throughout the country.

Our work is rooted in public interest — with a focus on delivering affordable housing options for ordinary citizens while championing innovation in the private sector. As the only private institution of its nature, we serve as a bridge between academic research, practical application, and policy-level impact.

By collaborating with government bodies, universities, and industry leaders, HBRC is steadily building a strong knowledge base and providing expert support in planning, design, construction, material, and technology use, especially in disaster-prone and resource-limited contexts.

We believe that, through collective effort and innovation, we can reshape the housing sector of Bangladesh and ensure access to safe, sustainable, and inclusive housing for all.



Mohammad Abu Sadeque, PEng.
Executive Director
Centre for Housing and Building
Research (HBRC)



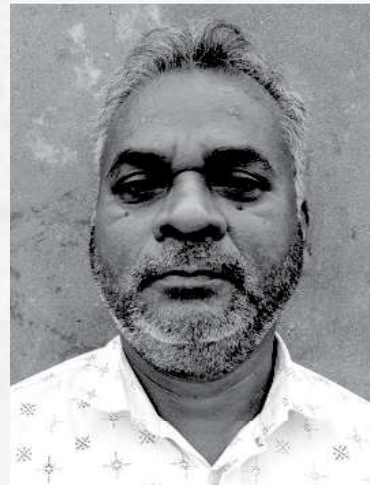
Mohammad Abu Sadeque, PEng.
Executive Director



Ms. Tajkera Khair
Social &
Gender Expert



Shafinaz Sameen
Principal Research
Architect



Md. Shahinul Islam
Research Assistant



Md. Shakil Robin
Executive
Promotion & Branding

Team Members



Sheikh Arif Istiak
Civil Engineer
Research Assistant



Pallabi Dutta
Architect
Research Assistant



Md. Nazmus Sakib
Architect
Research Assistant



Navian Jihad
Architect
Research Assistant



Md. Masbha Uddin
Research Assistant



Jashim Uddin
Research Assistant



Abu Bokkar Siddik
Research Assistant



Deepak Chandra Sheel
Research Assistant

The Centre for Housing and Building Research (HBRC) has been honored with several prestigious national and international awards recognizing its leadership in sustainable and innovative construction technologies.



EBL climate change Action 2025
Category: energy efficiency



V.D.Joshi Award - 2023
Category: Best Ferrocement Structure

The EBL Climate Change Action Award was launched in 2025 by Eastern Bank Limited (EBL) in partnership with the German, French, and Danish embassies in Bangladesh. This yearly award honors remarkable achievements in combating climate change across five distinct categories. During the inaugural event, HBRC received recognition among other prominent organizations for its significant role in advancing sustainable practices and supporting a green economy in Bangladesh, winning the award in the Energy Efficiency category.

Additionally, in 2023, HBRC was honored with the prestigious Late V.D. Joshi Award, established by the Ferrocement Society of India. This award recognizes outstanding innovation and quality in ferrocement construction, promoting environmentally friendly and affordable building techniques. It acknowledges the blend of traditional craftsmanship and modern innovation, motivating professionals globally to advance sustainable construction practices.



উন্নয়ন মেলা-২০১৯

Category: সেরা সম্ভাবনাময় পরিবেশবান্ধব স্থাপনা সামগ্রী

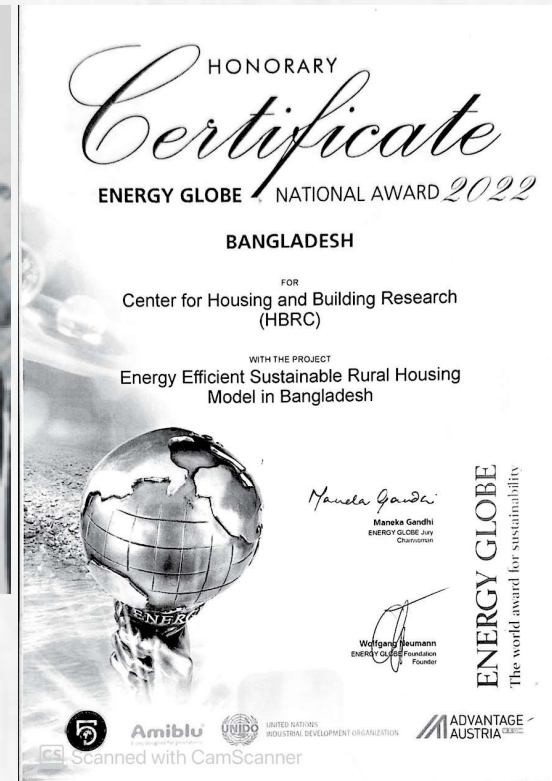


MOU SIGNING

HBRC is honored to be a recipient of the internationally acclaimed Energy Globe Award, which is presented by the Austria-based Energy Globe Foundation. Established in 1999 by Wolfgang Neumann, the award recognizes outstanding environmental sustainability projects from more than 180 countries, covering categories such as Earth, Fire, Water, Air, and Youth. Backed by prominent global figures, this prestigious award underscores HBRC's commitment to leading innovations in climate-resilient construction. HBRC received this distinction twice, in 2022 and 2023, specifically in the Earth category.



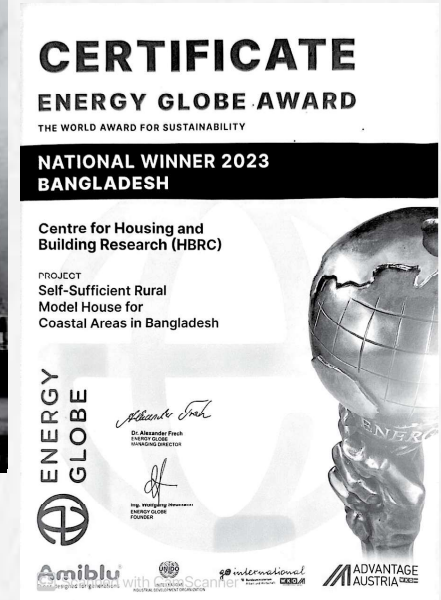
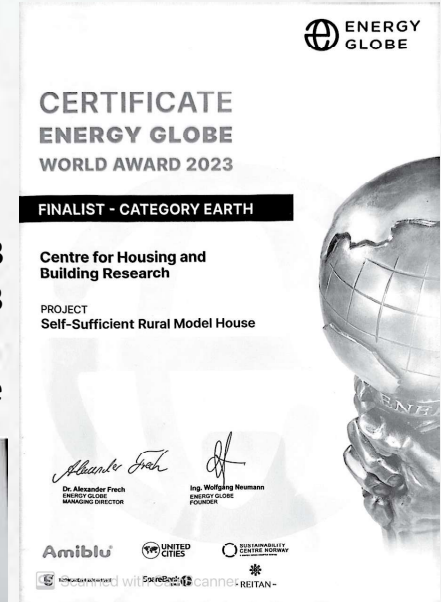
Energy Globe National Award 2022
Category: EARTH
Project: Energy Efficient Sustainable
Rural Housing Model in Bangladesh



Energy Globe World Award Finalist 2023
Energy Globe National Winner 2023
Category: EARTH
Project: Self Sufficient Model House



Energy Globe Award - 2023
Category : Earth

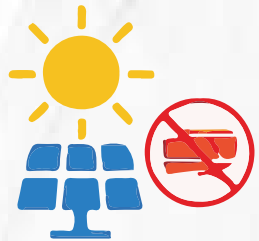


H B R C



1. Resource & Environmental Efficiency

Prioritize local, sustainable, and recycled materials.



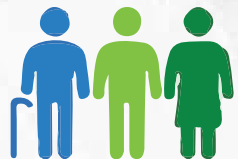
2. Energy Efficiency

Say no to burnt bricks—choose materials with low embodied energy.



3. Climate & Disaster Resilience

Design for floods, cyclones, earthquakes, and other local hazards.



4. Affordability & Social Inclusion

Ensure cost-effective and inclusive solutions.



5. Health, Safety & Comfort

Ensure healthy materials and safe living conditions.



6. Cultural & Contextual Fit

Respect local culture, climate, and building traditions.



7. Community Engagement & Adaptability

Involve local communities and allow for future expansion.



1. Research & Innovation

Developing and testing eco-friendly, energy-efficient, and locally adapted building materials and technologies, such as ferrocement and hollow block, to support affordable and sustainable construction.



2. Model Projects & Demonstration

Showcasing real-world pilot and demonstration projects—especially in disaster-prone and low-income areas—to inspire replication and scaling.



3. Training & Capacity Building

Empowering professionals and communities with hands-on training, workshops, and seminars, building expertise in sustainable construction practices.



4. Policy Advocacy & Knowledge Sharing

Advising on policy updates, setting standards, and widely sharing research, technical guidelines, and success stories through digital, print, and public outreach.



5. Partnerships & Environmental Leadership

Working collaboratively with government, NGOs, the private sector, and international partners to drive environmental sustainability, promote resource-efficient alternatives to traditional bricks, and scale up the impact of sustainable construction practices.

DEMONSTRATION HOUSE

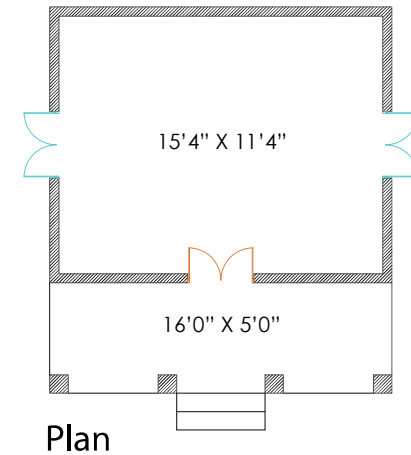
Project Type : Residence

Location : Purbachal, Dhaka

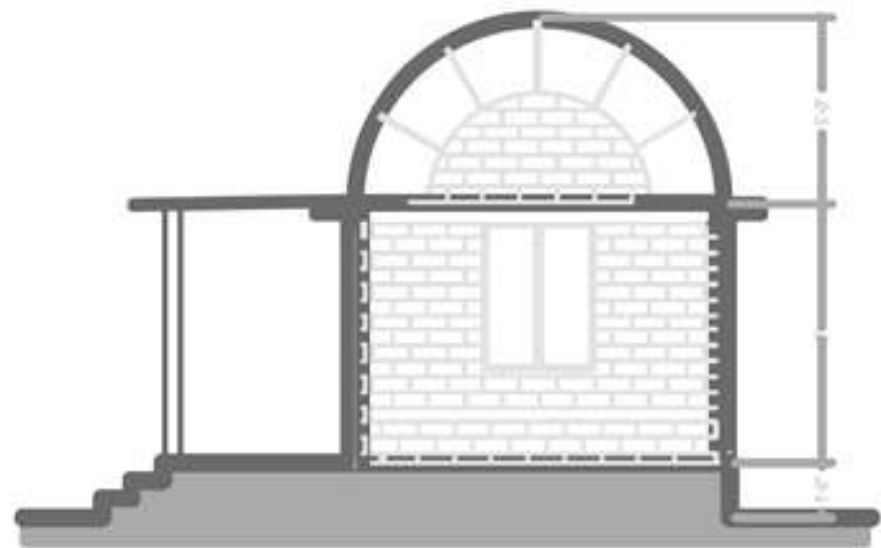
Area : 272 sft.

Status : Completed

Award : Energy Globe World Award 2022



Technology	Ferrocement
Foundation	Block Masonry
Wall	Concrete Hollow Block & CSEB
Floor & Roof	Ferrocement
Door, window frame & shutter	Ferrocement
Carbon Footprint	6 kg/sft. (30% of conventional one)
Social Cost	Very Low



Elevation

SELF SUFFICIENT MODEL HOUSE

Project Type : Residential

Location : Purbachal, Dhaka

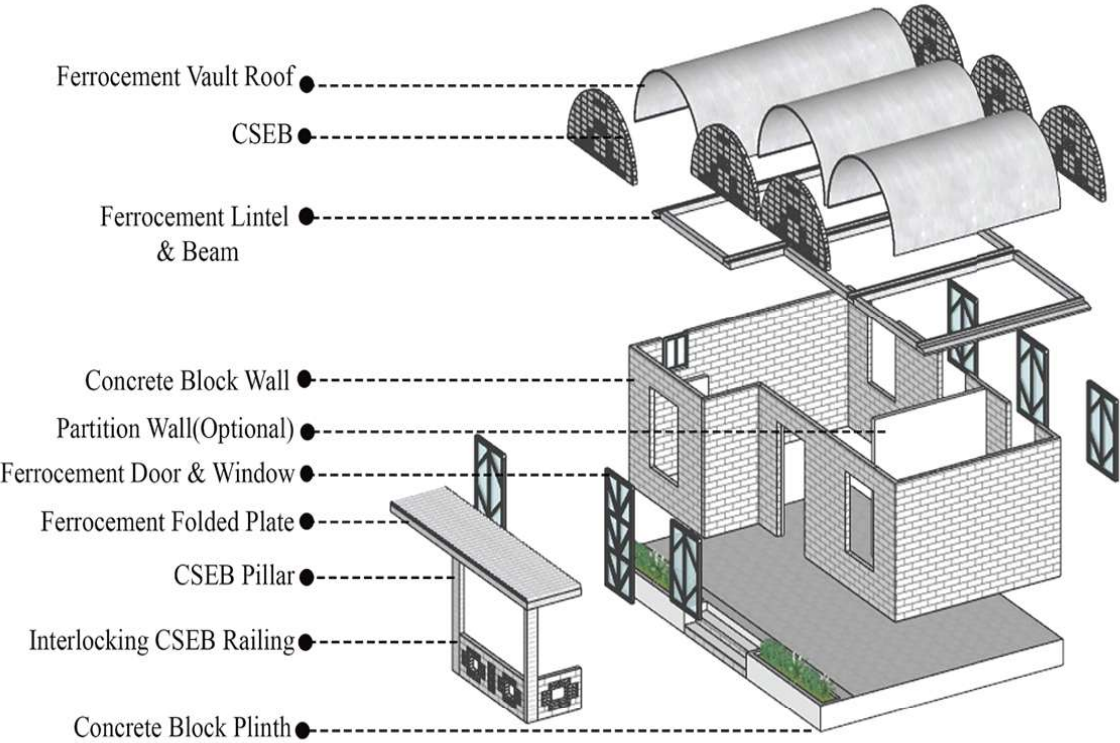
Area : 375 sft.

Status : Completed

Award : Energy Globe Award 2023 & V. D. Joshi Award 2023



Technology	Ferrocement
Foundation & Wall	Block masonry
Floor	Cast in situ Ferrocement
Beam & Roof	Ferrocement
Door, window frame & shutter	Ferrocement
Carbon Footprint	6 kg/sft. (30% of conventional one)
Social Cost	Very Low



Lorem ipsum

Exploded View

MIRZAPUR CADET COLLEGE SCHOOL

Project Type: School

Location : Mirzapur, Tangail

Area : 11080 sqf.

Status : Nearly Completed



Technologies	Concrete & Ferrocement
Foundation, Column & Beam	Reinforced Concrete (RC)
Floor	Concrete Hollow Block & Ferrocement
Slab, Sunshade & Drop	Ferrocement
Carbon Footprint	10 kg/sft. (25% of conventional one)
Social Cost	Low



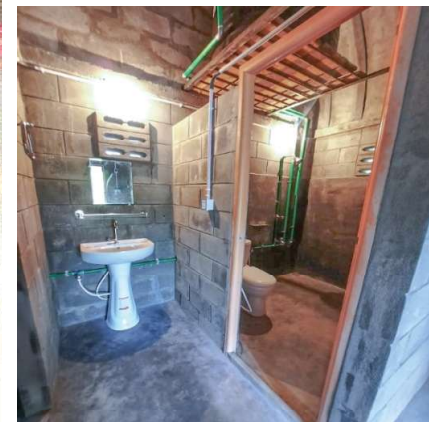
HOME FOR SPECIALLY ABLED PERSON

Project type : Residence

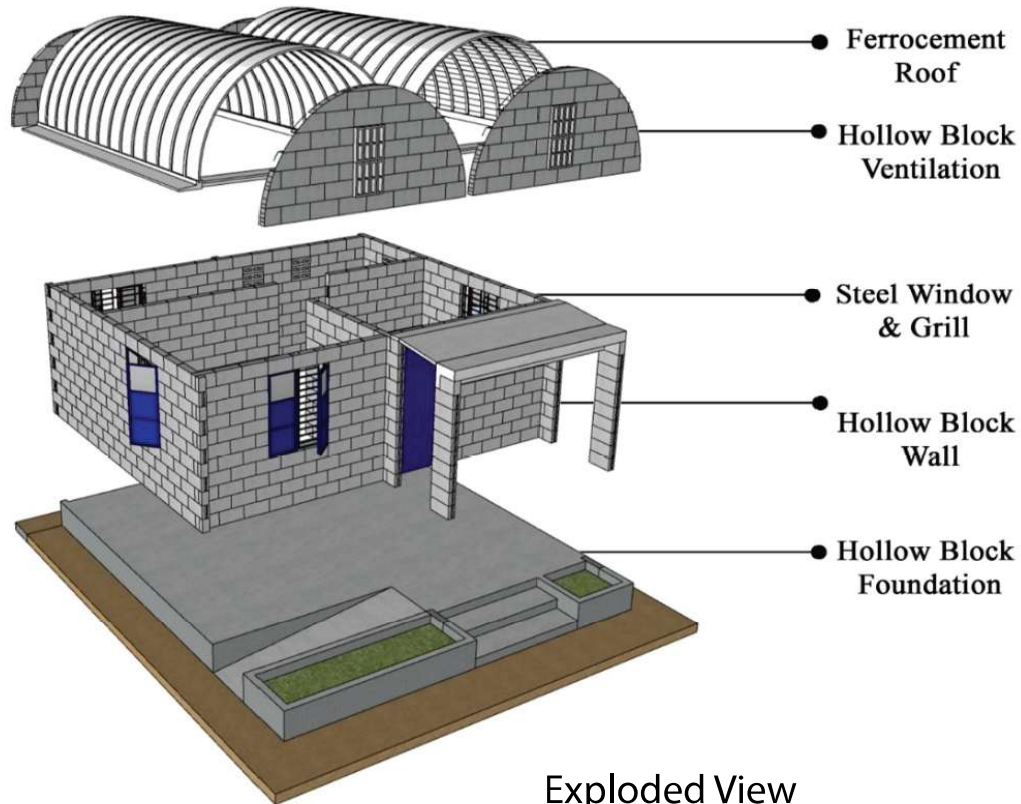
Location : Dinajpur

Area : 425 sft.

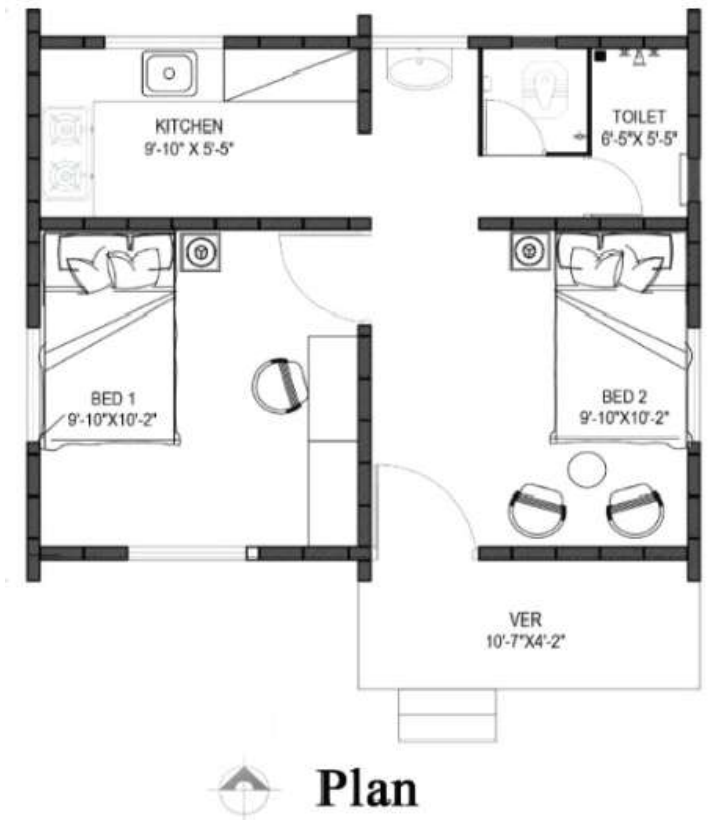
Status : Completed



Technology	Ferrocement
Foundation & Wall	Block masonry
Floor	Ferrocement (In situ)
Roof	Ferrocement (Pre-cast)
Carbon Footprint	6 kg/sft. (30% of conventional one)
Social Cost	Very Low



Exploded View



Plan

LAXMIPUR HOSPITAL

Project Type: Hospital

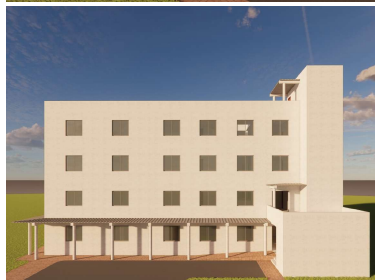
Location: Dalal Bazar, Laxmipur.

Area: 11040 sft.

Status: Ongoing



Technologies	Concrete & Ferrocement
Foundation, Column, Beam	Concrete
Floor, Slab, Roof	Ferrocement
Wall	Ferrocement Sandwich Panel & Concrete Hollow Block
Staircase	Ferrocement
Parking	Locally Made Concrete Block
Carbon Footprint	8 kg/sft. (20% of conventional one)
Social Cost	Low



DISASTER RESILIENT STILT HOUSE

Project Type : Disaster Resilient Shelter
(Demo House)

Location : Purbachal, Dhaka

Area : 450 Sft.



Technology	Ferrocement
Foundation, Column, Beam	Ferrocement
Floor, Slab, Roof	Ferrocement
Wall	Concrete Hollow Block, Interlocking Block, Thermal Block, Sandwich Panel etc.
Staircase	Ferrocement
Carbon Footprint	6 kg/sft. (30% of Conventional one)
Social Cost	Very Low



PORTABLE CLIMATE CHANGE ADAPTATION SHELTER

Project Type: Portable House

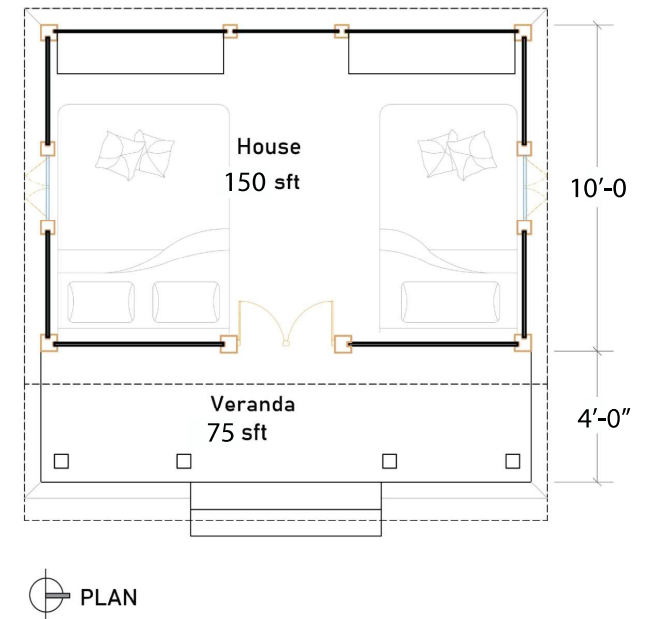
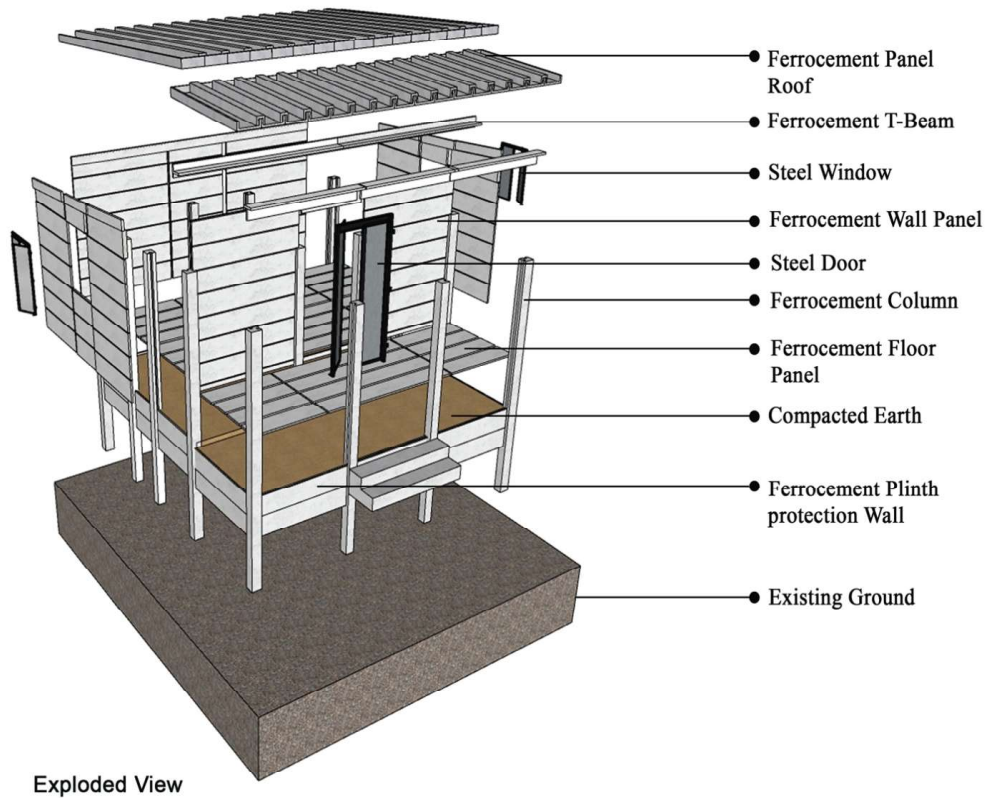
Location : Ukhiya, Cox's Bazar

Area: 225 sft

Status : Completed



Technology	Ferrocement
Foundation, Column & Beam	Precast Ferrocement
Floor	Precast Ferrocement
Wall & Roof	Precast Ferrocement
Carbon Footprint	7 kg/sft. (35% of conventional one)
Social Cost	Very Low



Residence

Project Type : Residential

Location : Sirajganj

Area : 1100 sft.

Status : Completed



Technology	Ferrocement
Foundation	Block Masonry
Floor	Concrete Hollow Block & Ferrocement
Wall	Concrete Hollow Block
Roof	Ferrocement with water proof thermal insulation finish
Carbon Footprint	6 kg/sft. (30% of conventional one)
Social Cost	Very Low





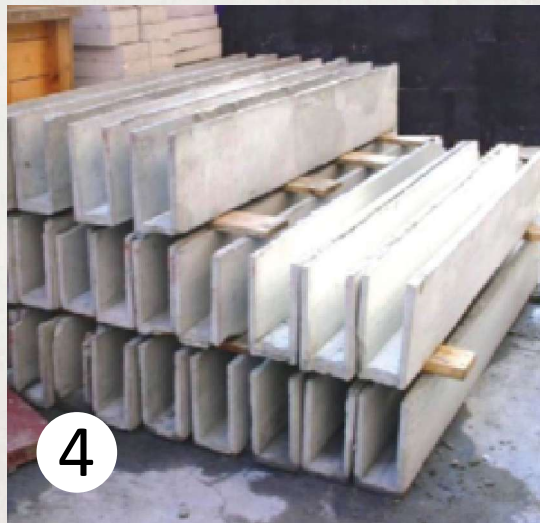
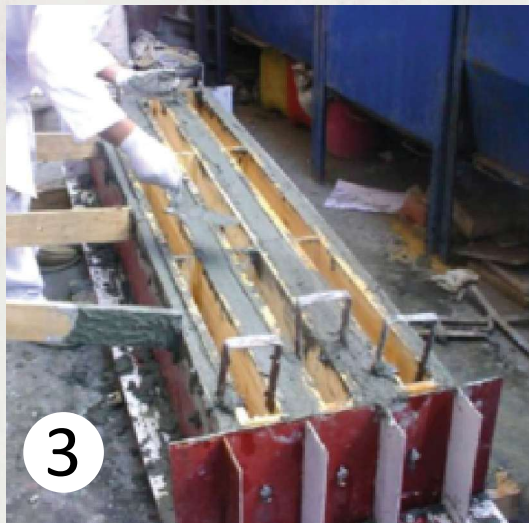
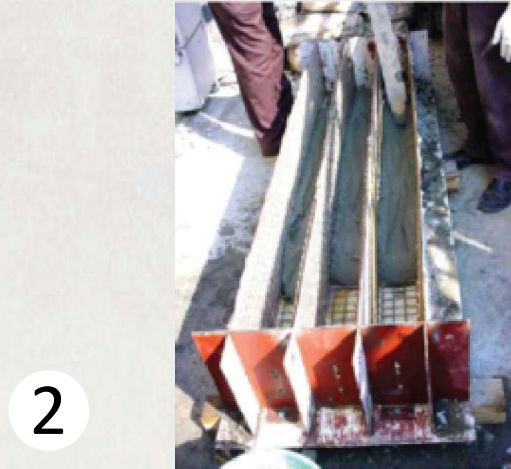
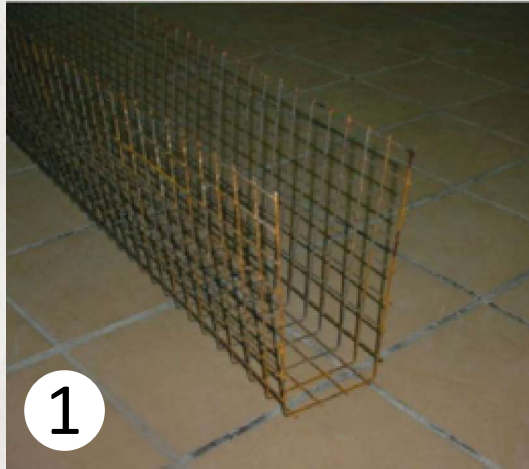
Ferrocement

Ferrocement (Ferrocement) is an adaptable and economical composite construction material made by embedding tightly spaced wire mesh or fine rods within a high-quality cement mortar. For affordable and disaster-resilient housing, ferrocement is distinguished by its impressive strength-to-weight ratio, enabling the creation of lightweight yet sturdy structures with thinner profiles without sacrificing durability.

Particularly suitable for regions prone to earthquakes, floods, and cyclones, ferrocement excels due to its outstanding crack and impact resistance. It offers considerable cost savings by utilizing abundant materials like sand, eliminating the need for imported stone aggregates, and significantly reducing the requirement for formwork compared to conventional reinforced concrete. Its malleability allows it to be shaped into various structural and non-structural elements such as foundations, roofs, walls, beams, columns, domes, vaults, water tanks, septic tanks, sewer pipes, toilets, and prefabricated components.

Buildings constructed with ferrocement are long-lasting, waterproof, and demand very little maintenance—even in severe environmental conditions. Its adaptability and cost-effectiveness position ferrocement as an optimal solution for sustainable construction in climate-vulnerable and low-income rural and urban communities in Bangladesh and similar developing countries.

Moreover, ferrocure serves as a viable substitute for clay burnt bricks, CGI sheets, and, to a degree, reinforced concrete, offering a versatile and sustainable alternative where traditional materials may be less durable, more expensive, or less environmentally friendly.



Step 1: Forming the steel mesh.

Step 2: Casting the bottom of the U-shaped forms.

Step 3: Casting the sides of the U-shaped forms.

Step 4: Removing molds and curing.

Two types of construction process is discussed here. They are cast in-situ ferrocement & precast ferrocement

Cast In-Situ Ferrocement

Cast-in-situ ferrocement refers to a construction method where the structure is built directly on the site. The reinforcement mesh is shaped in its final position, and cement mortar is applied over it by hand or spray. This method allows for continuous and seamless construction, especially beneficial for unique architectural forms.

Advantages:

- Allows the creation of custom shapes and sizes directly on the construction site.
- Eliminates the need for transporting large prefabricated elements.
- Especially suitable for irregular, curved, or monolithic structures such as domes and water tanks.
- Easily integrates with existing or ongoing construction frameworks.

Disadvantages:

- The process is labor-intensive and may require skilled craftsmanship.
- Construction time is generally longer compared to precast methods.
- On-site environmental factors (e.g., weather) can affect construction quality.





Precast ferrocement

Precast ferrocement involves manufacturing structural components in a factory or controlled setting and then transporting them to the construction site for installation. This method ensures a higher level of quality control and consistency and is ideal for repetitive building elements.

Advantages:

- High-quality finish due to controlled factory conditions and precise supervision.
- Significantly faster on-site installation, saving construction time.
- Reduced material waste and labor costs at the construction site.
- Ideal for mass production of modular components like panels or partitions.

Disadvantages:

- Transportation of large or heavy precast components can be costly and complex.
- On-site adjustments are limited; any design changes are harder to accommodate.
- Requires careful planning of joint design to maintain structural integrity.

Ferrocement planters

Ferrocement planters are plant containers made using a mixture of cement and sand applied over a skeleton of steel mesh or chicken wire. They are known for being durable, customizable, and affordable, making them a great choice for home gardens, landscapes, and urban green spaces.

Features of Ferrocement Planters

1. Durable and Long - Lasting - Resistant to weather, pests, and decay.
2. Thin & Lightweight - Thinner walls than concrete planters, reducing overall weight while retaining strength.
3. Highly Customizable - Easily shaped into various forms: round, square, rectangular, or freeform.
4. Low Cost - Made from inexpensive, readily available materials.
5. Eco-Friendly - Uses less concrete than solid concrete planters.
6. Good Water Retention with Drainage Options - Suitable for various plant types,





Alternative Building Materials

Alternative building materials and technologies refer to non-traditional construction solutions developed as substitutes for conventional materials and methods, such as burnt clay bricks, CGI sheets, reinforced concrete, and standard steel frameworks. Since 2018, HBRC has prioritized this area, focusing on locally available resources and innovative techniques to minimize environmental impact, enhance energy efficiency, reduce costs, and address specific local challenges. Examples include ferrocement, concrete blocks, thermal block, sandwich panel, cellular lightweight concrete (CLC), autoclaved aerated concrete (AAC), stabilized earth, compressed stabilized earth blocks (CSEB), interlocking and natural fibre-reinforced CSEB, interlocking concrete block, aerated concrete block (ACB), and prefabricated systems. Embracing alternative building materials and technologies promotes sustainable development by conserving resources, reducing the carbon footprint, and enabling resilient, affordable, and context-specific construction practices.



Concrete Block

Concrete blocks are traditional masonry units made from a mixture of cement, water, and aggregates. They are used in load-bearing and non-load-bearing walls due to their durability, affordability, and widespread availability.



Thermal block

Thermal blocks are specialized concrete or composite blocks engineered for improved thermal insulation. They are often used in energy-efficient or passive house designs to reduce heat transfer and minimize energy costs.



Sandwich panel

Sandwich panels consist of two outer layers (usually metal or concrete) with an insulating core material (such as polyurethane foam, expanded polystyrene, or rock wool). These panels are prefabricated, lightweight, and provide



Cellular Lightweight Concrete (CLC)

CLC is a type of lightweight concrete produced by mixing a cement slurry with a stable foam. It is non-toxic, thermally insulating, and soundproof. CLC blocks are easy to handle and suitable for both residential and commercial buildings. excellent thermal and acoustic insulation.



Autoclaved Aerated Concrete (AAC)

AAC is a precast building material made by curing aerated concrete under high-pressure steam in an autoclave. These blocks are lightweight, provide excellent insulation, and are fire-resistant. AAC is widely used in high-rise construction.



Compressed Stabilized Earth Blocks (CSEB)

CSEBs are eco-friendly blocks made by compressing a mixture of soil, sand, and a stabilizer (like cement or lime). They offer low embodied energy, good thermal performance, and can be produced locally with minimal equipment.



Aerated Concrete Block (ACB)

ACBs are similar to AAC blocks, made from air-entrained concrete. They are lightweight, offer good thermal insulation, and reduce dead load on structures. ACBs help accelerate construction timelines.



Interlocking and Natural Fibre-Reinforced CSEB

These are enhanced versions of CSEBs that include interlocking shapes for mortar-less stacking and natural fibres like jute, straw, or coir for improved tensile strength. This method increases sustainability while reducing construction time.



Interlocking Concrete Block

Interlocking concrete blocks are precast units designed to fit together like puzzle pieces. They are used for retaining walls, pavements, and low-rise construction. These blocks allow for dry stacking and are reusable.



Say No to Plastic

Reasons to avoid using bricks



1. Non-Biodegradable

Plastic can take hundreds to thousands of years to break down. It doesn't decompose naturally and instead breaks into microplastics that pollute soil, water, and air permanently.

2. Pollutes Water & Land

Animals often mistake plastic for food, leading to choking, internal injuries, or death. Marine life is particularly vulnerable — turtles, birds, and fish often ingest or become entangled in plastic waste. An estimated 11 million metric tons of plastic enters the oceans annually.



3. Toxic Production Process

Plastic is made from fossil fuels (petroleum and natural gas), and its production releases toxic chemicals and greenhouse gases. These emissions contribute to climate change and air pollution.

Say No to Bricks

Reasons to avoid using bricks



1. Excessive use of Topsoil



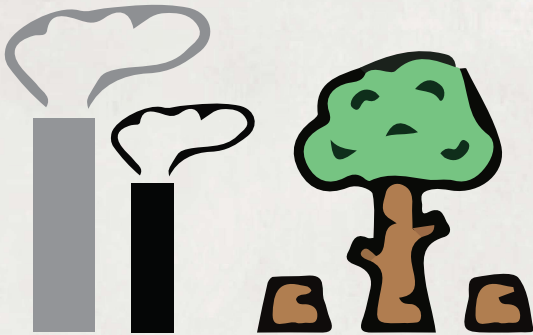
Clay bricks are made from fertile topsoil, which is crucial for agriculture and plant life. Large-scale brick manufacturing contributes to soil erosion and loss of arable land, especially in rural areas. Clay extraction involves digging the land, often in protected or fertile areas, which leads to deforestation, habitat destruction, and loss of biodiversity.

2. High Energy Consumption

Bricks are typically fired in kilns at $\sim 1000^{\circ}\text{C}$, using coal, firewood, or natural gas. This process consumes vast amounts of non-renewable energy, contributing to resource depletion.



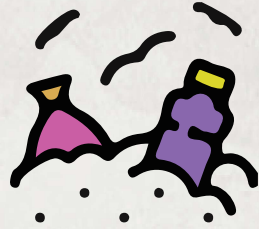
3. Air Pollution and Deforestation



Brick kilns contribute to 20% of the overall carbon emissions released into the atmosphere and rank among the primary sources of air pollution in Bangladesh. Each year, air pollution causes the deaths of approximately 236,000 people nationwide, including 19,000 children. The process of brick manufacturing significantly impacts climate change and worsens local air quality. Moreover, it is a major factor driving extensive deforestation.

Say No to Corrugated Iron Sheet

Reasons to avoid using corrugated metal sheet

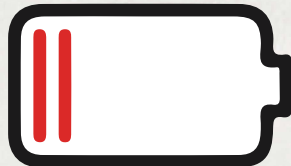
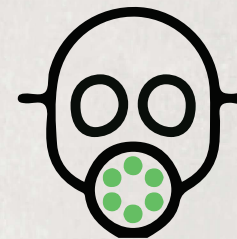


1. High Energy Consumption

Corrugated metal sheets are often made from steel, aluminum, or zinc, which require intensive mining, smelting, and rolling processes. These processes are extremely energy-intensive and usually powered by fossil fuels.

2. High Greenhouse Gas Emissions

The production of metals (especially steel) accounts for ~7–9% of global CO₂ emissions.



3. Poor Thermal Performance

Extremely hot interiors in warm climates require the use of fans or insulation. This results in higher energy consumption throughout the building's lifecycle.



4. Vulnerable to disasters

Highly vulnerable to disasters such as cyclones, tornadoes, fires, etc.

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H B R C

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