BTCM
Building Technology, Construction Materials & Management

Centre of Excellence on Technologies for Low-Carbon and Lean Construction


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Overview

01 Our Vision	02 Our Mission	03 Our Projects
04 Our Collaborators	05 Start up mentoring	06 Future plans

Our Vision

- ✓ **Zero-Carbon & Zero-Waste Construction**
- ✓ **Reducing embodied CO_2 emission**

Our Mission

Recycle and Reuse Material Wastes

+

Minimize Process Waste

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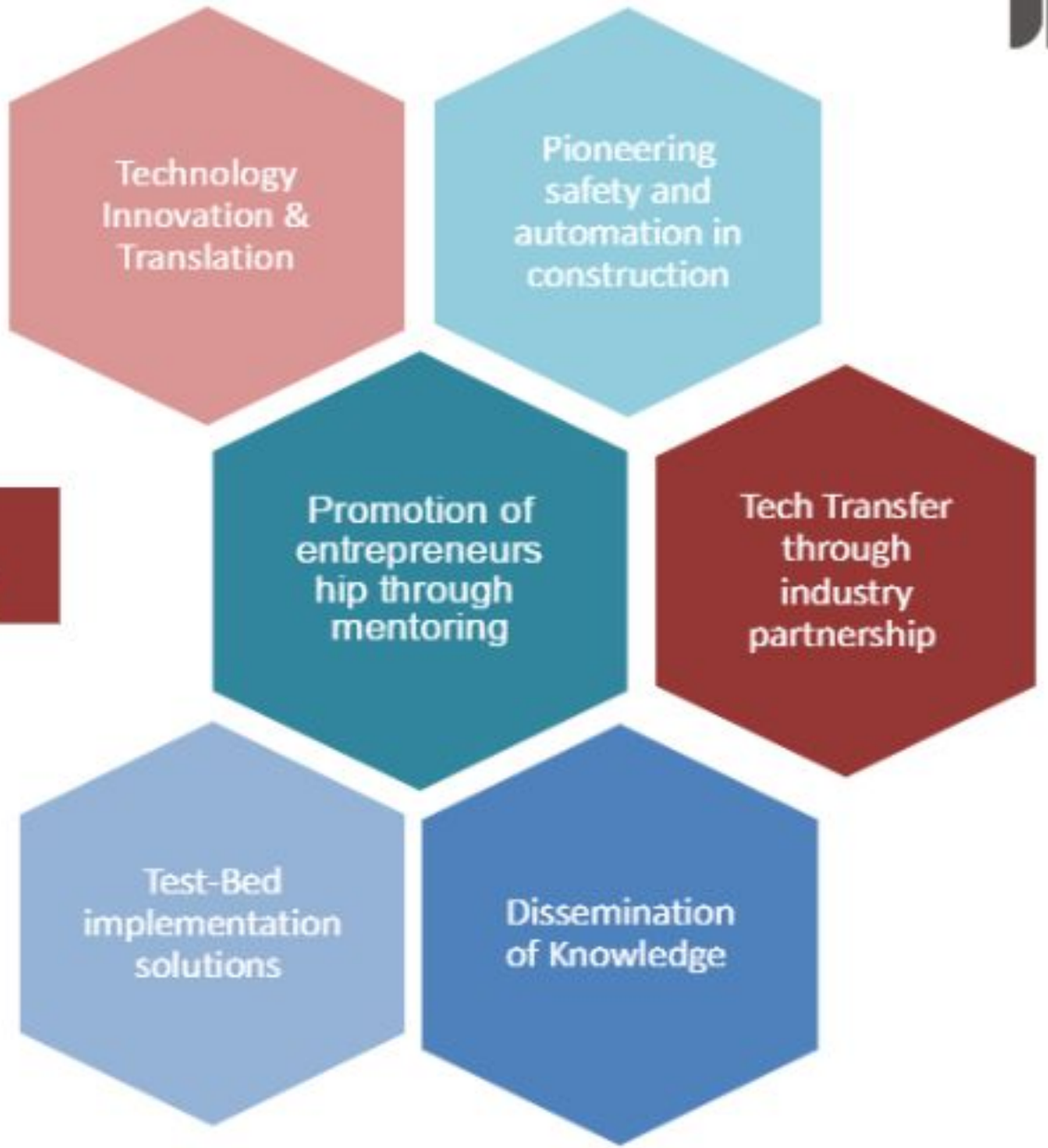
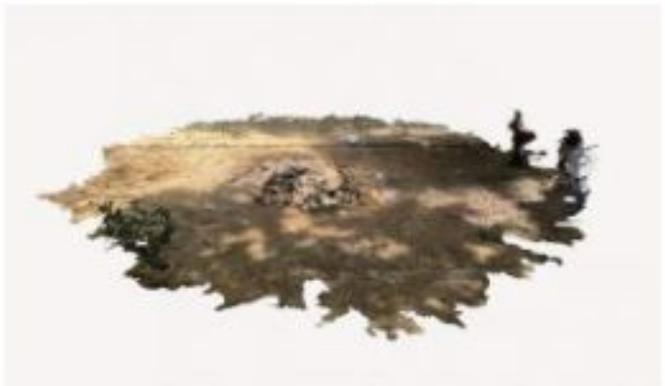
Sustainable Construction

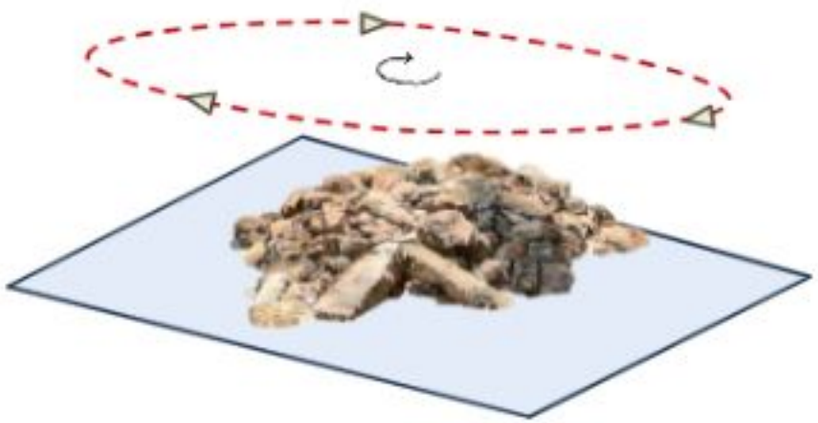


Our Projects

Use of recycled materials

Digitized Quantification





Intelligent Segregation

Sustainable Processing

Solar Energy

Recycled Aggregates

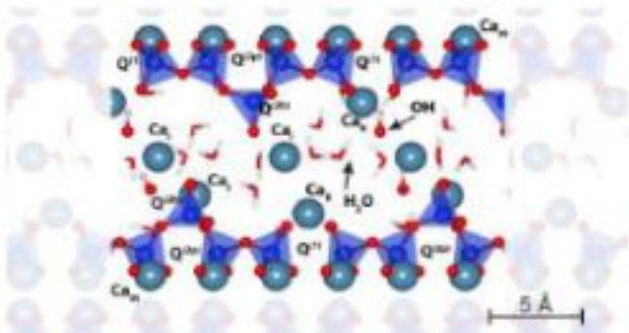
Our Projects

Zero emission concrete

Alternative Raw Materials

- Low-Grade Limestone
- Biomass
- Overburden Clay

Low-carbon Cements



- Mini cement plant
- Low Energy Cement
- Molecular Modelling

Sustainable Concrete

- LC3 house
- LC3 Tetrapod
- Biomass Ash bricks

Our Projects

Precast construction

Technology Development

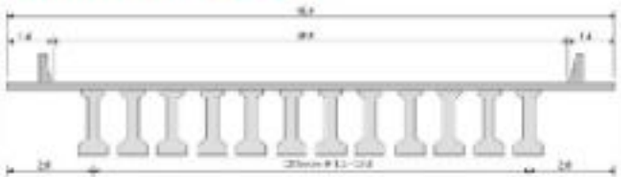
- Tendonfill grout
- TRC Sewage treatment plant
- FRC tunnel linings

Promotion and Implementation

- Completed sports complex
- Upcoming PPVC hostel, designed for deconstruction

Standardization

M45 concrete; 1284 Tons



M60 concrete; 744 Tons; 40% savings

Bridge sector

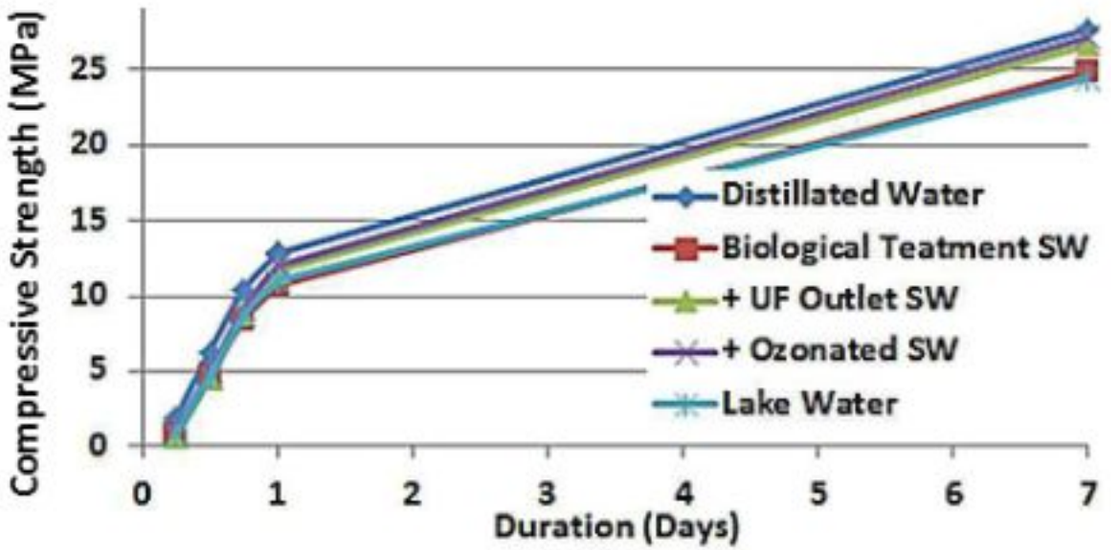
- BIS standard

Our Projects

Wastewater recycling

Source Water Characterization

Concrete with Treated Wastewater



- BIS standard
- Policy to allow non-potable water (with clear guidelines) in construction

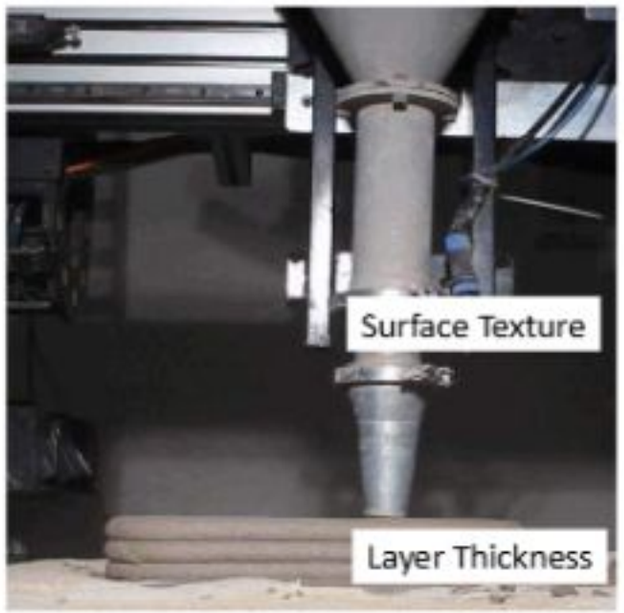
Our Projects

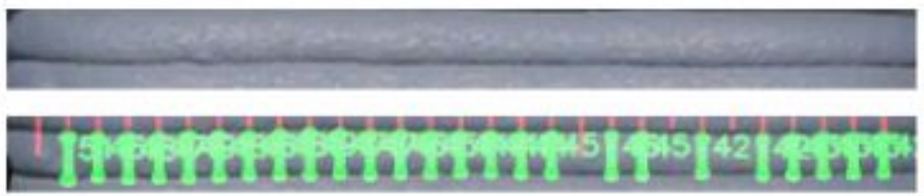
Quality and Safety

Virtual Reality Training

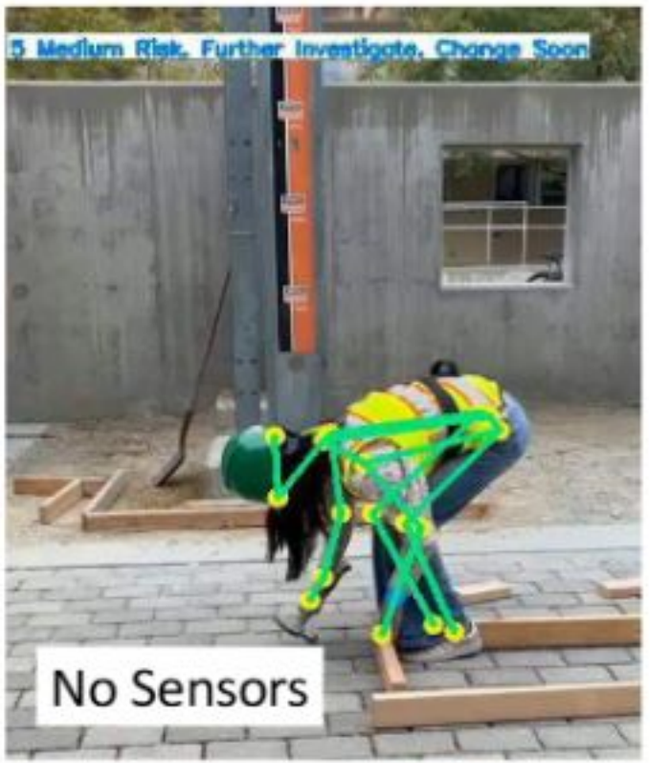
- VR training for workers for Quality

AI-based Risk Assessment





- Early Prediction of Failure



- Posture Analysis

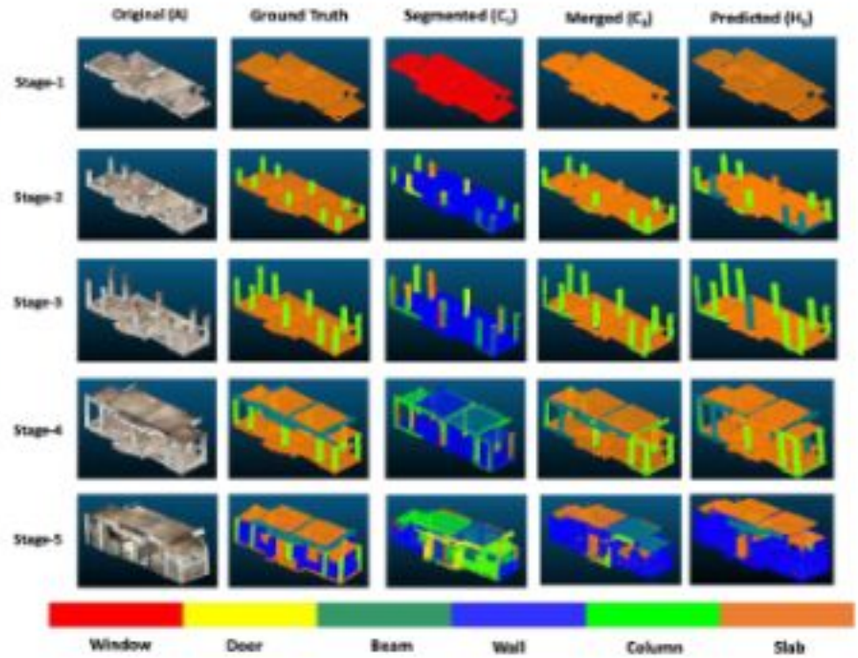
Our Projects

Contract Management

AI-based Contract Risk Assessment

- Cross-Referencing Implicit Clauses
- Contract clauses and their risk potential

AI-based Contractual Progress Monitoring



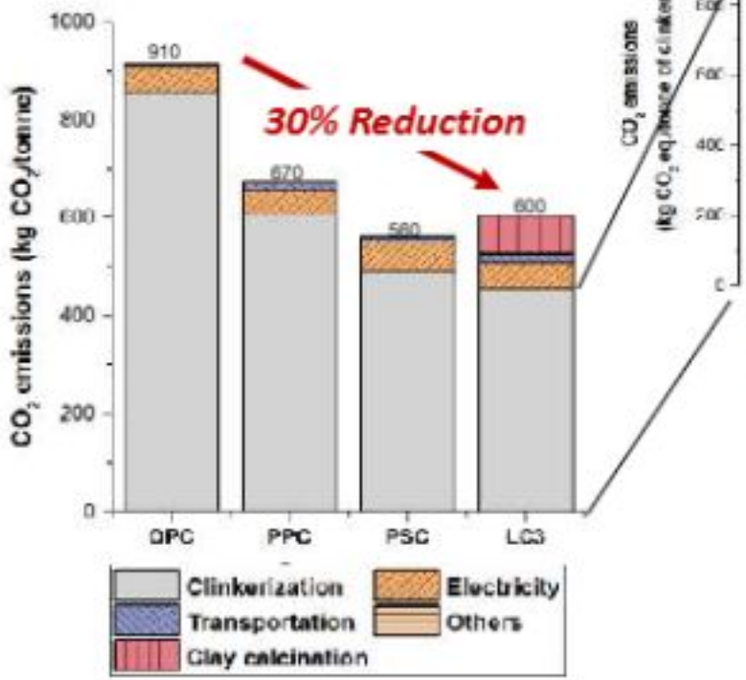
- Stage-wise progress detection

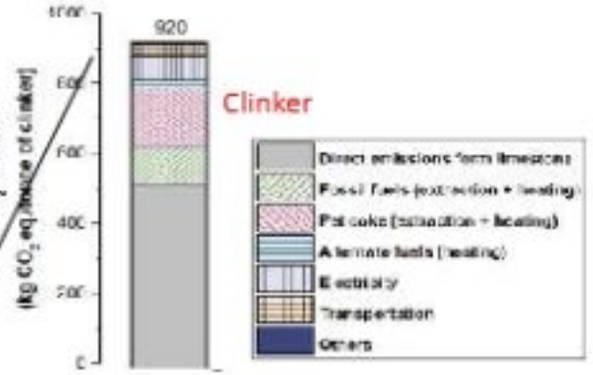
Our Projects

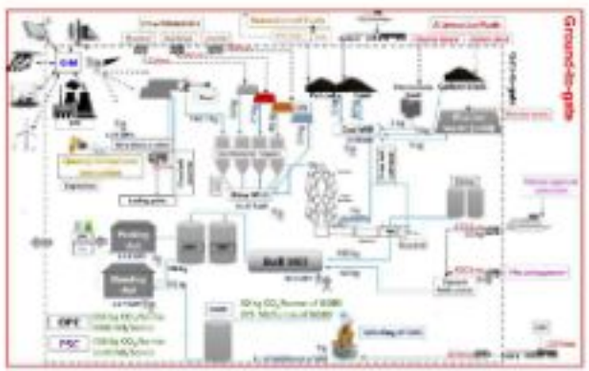
Life Cycle Assessment (LCA)

Cement

Low-carbon materials

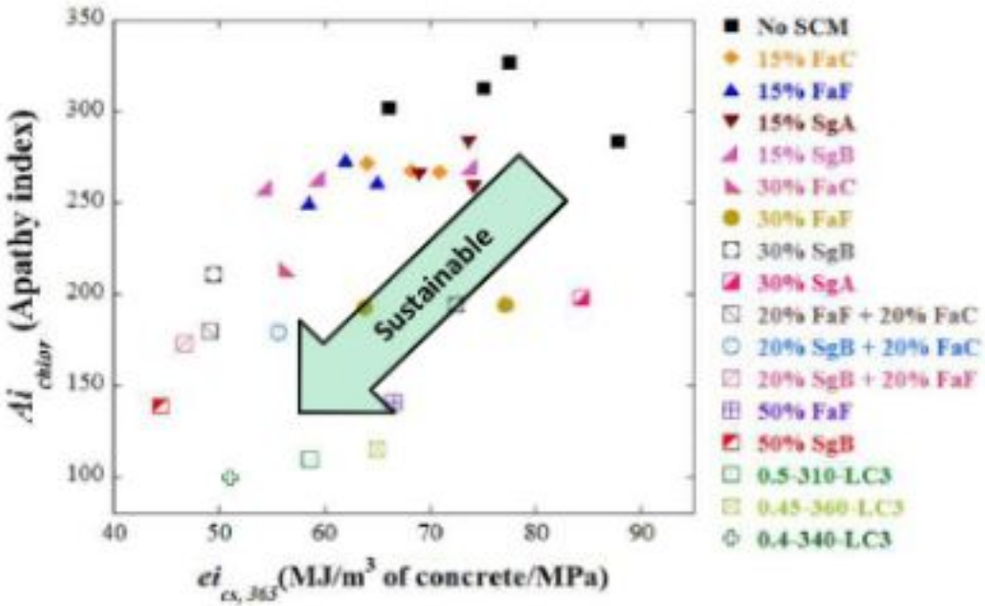






Process mapping of cement manufacturing

Concrete Mixes



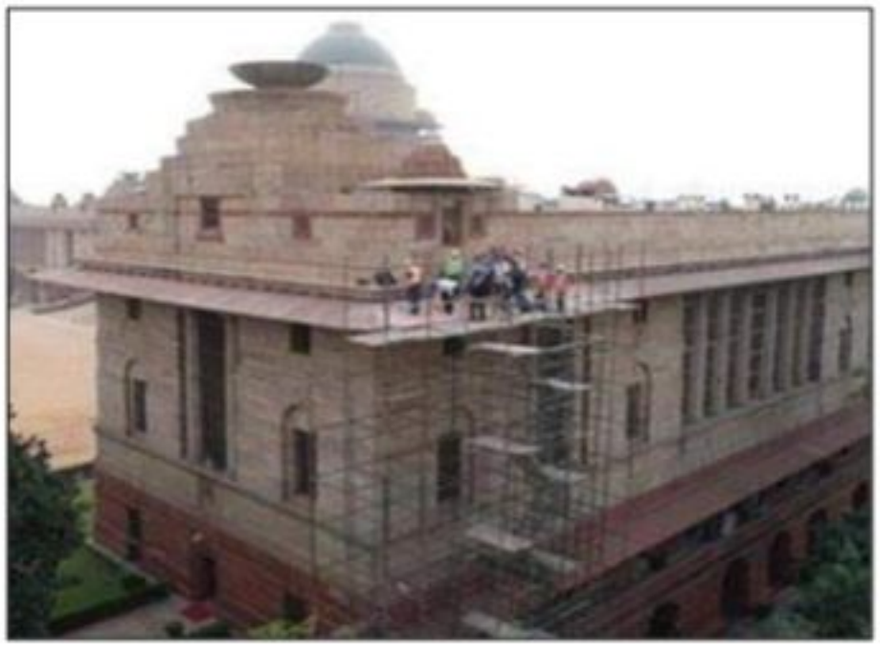
Framework for sustainable concrete design

- Strength and Workability
- Durability

Technology Translation

Concrete foundation
(1000-year design life)
Ayodhya

125 years service life
Coastal Bridge, **Kollam, Kerala**

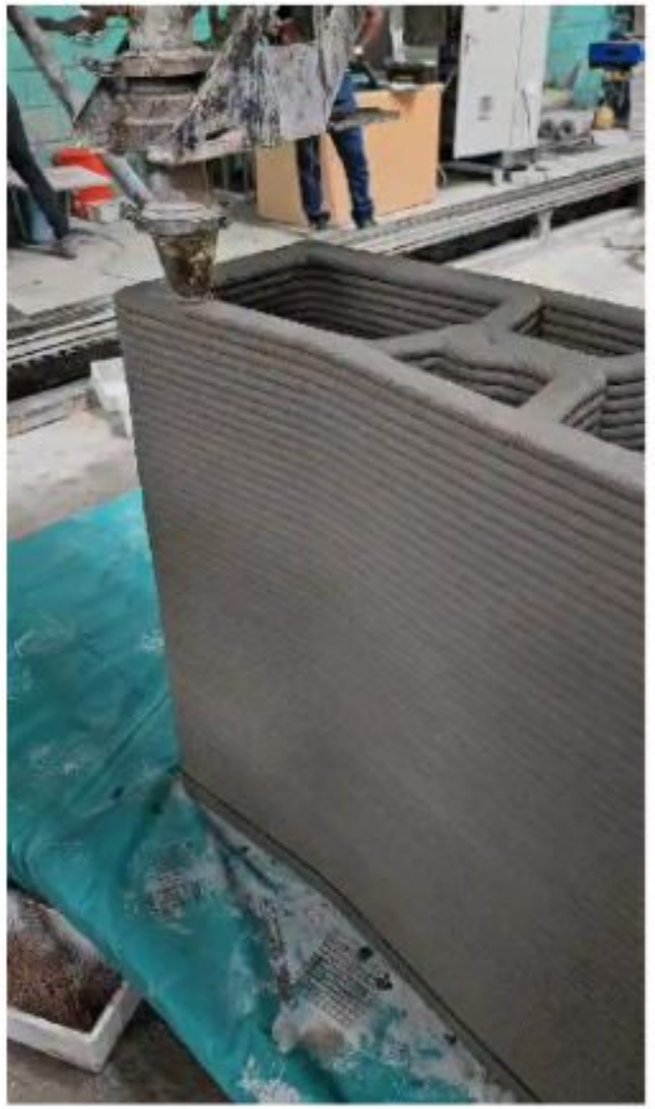


Durable repair (50-year life extension)
Rashtrapati Bhawan, New Delhi

Low-carbon materials

Technology Translation

Lean project delivery for
Godrej Constructions, Mumbai



Guest house construction
(3D concrete printing)
IIT Madras, Chennai

Our collaborators – Industry

Our collaborators – Academic

North America:

- Massachusetts Institute of Technology
- Oregon State University
- Texas State University
- Clemson University
- Michigan State University
- Stanford University
- Univ. of Texas at Arlington
- Univ. of Toronto
- Virginia Tech Univ.
- Arizona State Univ.

South America:

- Universidad Nacional de La Plata (Argentina)
- Univ. Federal de Rio de Janeiro (Brazil)

South Africa:

- Univ. of Cape Town
- Univ. of Witwatersrand

Australia:

- University of New South Wales
- Curtin University

UK & Europe:

- University of Leeds
- Norwegian University of Science and Technology
- Brunel University
- Karlsruhe Institute of Technology, Germany
- Politechnico di Milano, Italy

Asia:

- Hong Kong Polytechnic University (China)
- National University of Singapore
- IIT Bombay
- IIT Roorkee
- IIT Kanpur
- IIT Tirupati
- NIT Calicut
- MACE, Kerala

Start-ups mentored by TLC2

Satiq Concrete Manufacturers

tvasta

MODULUS HOUSING

Market development & strategy advisory

CARBON® CRAFT

Handmade Cement Mortar Tiles with Waste Carbon

SLABS
SMART DESIGN
MODULAR CONSTRUCTION
FABRICATION DRAWINGS

Prefabricated Volumetric Construction

STRUFOCON

Structural Forensics and Conservation

WESTORT
Processing Waste for Better Tomorrow

Recycling of C&D waste

MALBA PROJECT

Policy on Waste Management

TLC2 – New projects since 2022

Project Title	Sponsoring agency	Duration	Sanctioned Budget
Affordable Sustainable Housing Accelerator – 3D printing in construction	Ministry of Housing and Urban Affairs	22-24	6.23 crore
Sustainable concrete pavements using high volumes of construction, demolition, and industrial wastes as constituent replacements.	Indo-German Science and Technology Centre	24-27	2.03 Crore
Piloting A Multi-Attribute Urban Sensing Technology for Sustainable Cities: Assessing Urban Metabolism, Form, Activities and Emissions at Fine Scales	NSF-MeitY	24-26	2.44 Crore* (Final budget negotiation)
A LIDAR scanning integrated with GIS technology to optimize the Construction and Demolition waste supply chain for urban areas in India	Ministry of Education	23-26	75 Lakhs
Elucidating the Role of Mineralogy, Aggregate-Mortar Bonding, and Comminution Mechanism on the Quality of Recycled Concrete Aggregates for Rigid Pavement Applications	SERB-DST	24-27	46 Lakhs
Sustainable concrete pavements using high volumes of construction, demolition, and industrial wastes as constituent replacements.	Kerala Highway Research Institute	22-24	36.85 Lakhs
Electrical and electrochemical modelling for routine, non-destructive testing of cathodic protection systems in reinforced concrete structures	SERB-DST	23-26	37 Lakhs
A Novel Framework for High Volume Utilization of Biomass Ash in Structural Materials	SERB	24-26	35 Lakhs

TLC2 –Industry Projects since 2022

Project Title	Sponsoring agency	Duration	Sanctioned Budget
CO2 Sequestration in Concrete with Supplementary Cementitious Materials	Reliance India	23-24	50 Lakhs
Use of foundry Sand in Pavement Applications	Yuken India	23-24	6.35 Lakhs

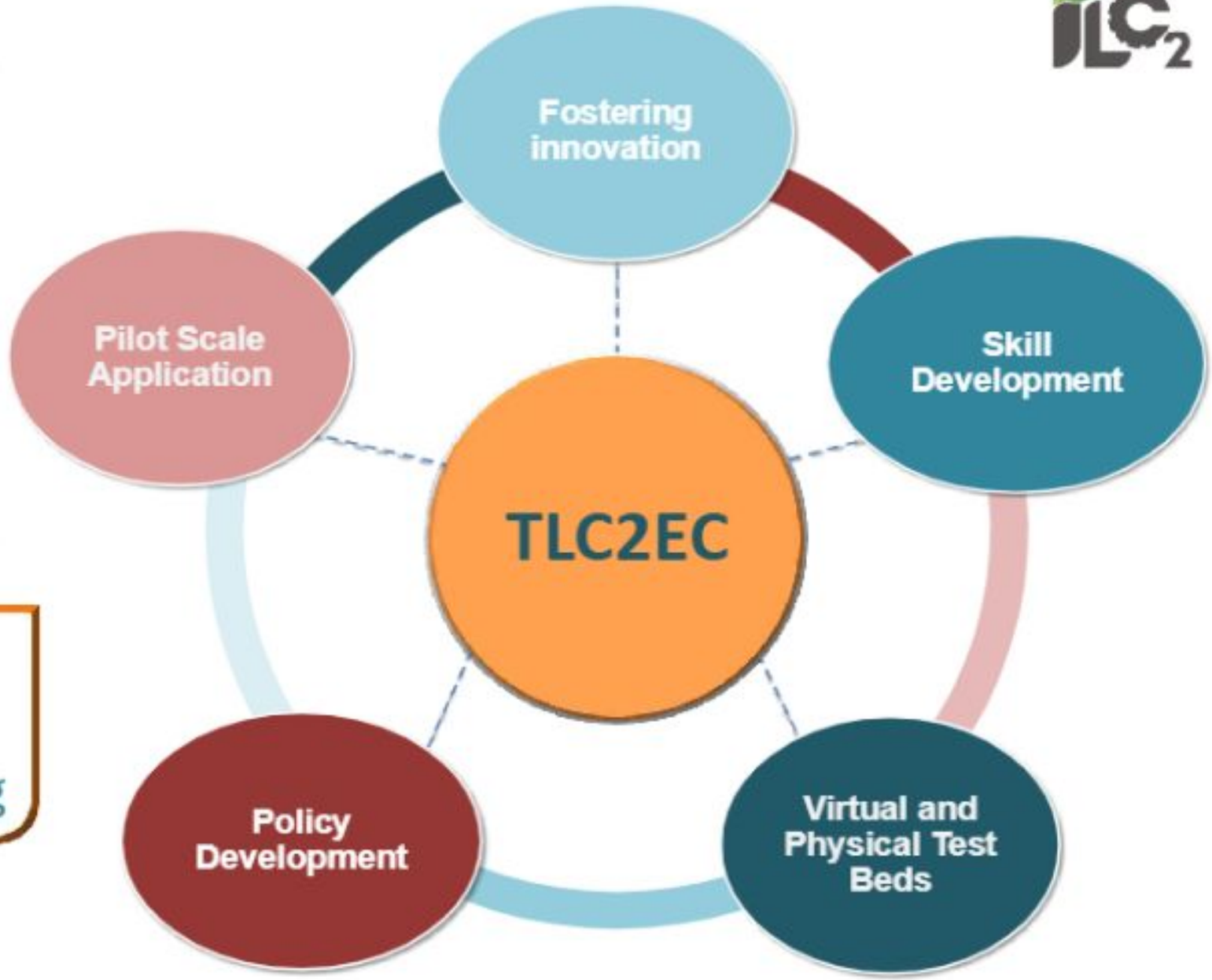
TLC2 Future Plans

TLC2 Experience Centre (TLC2EC)

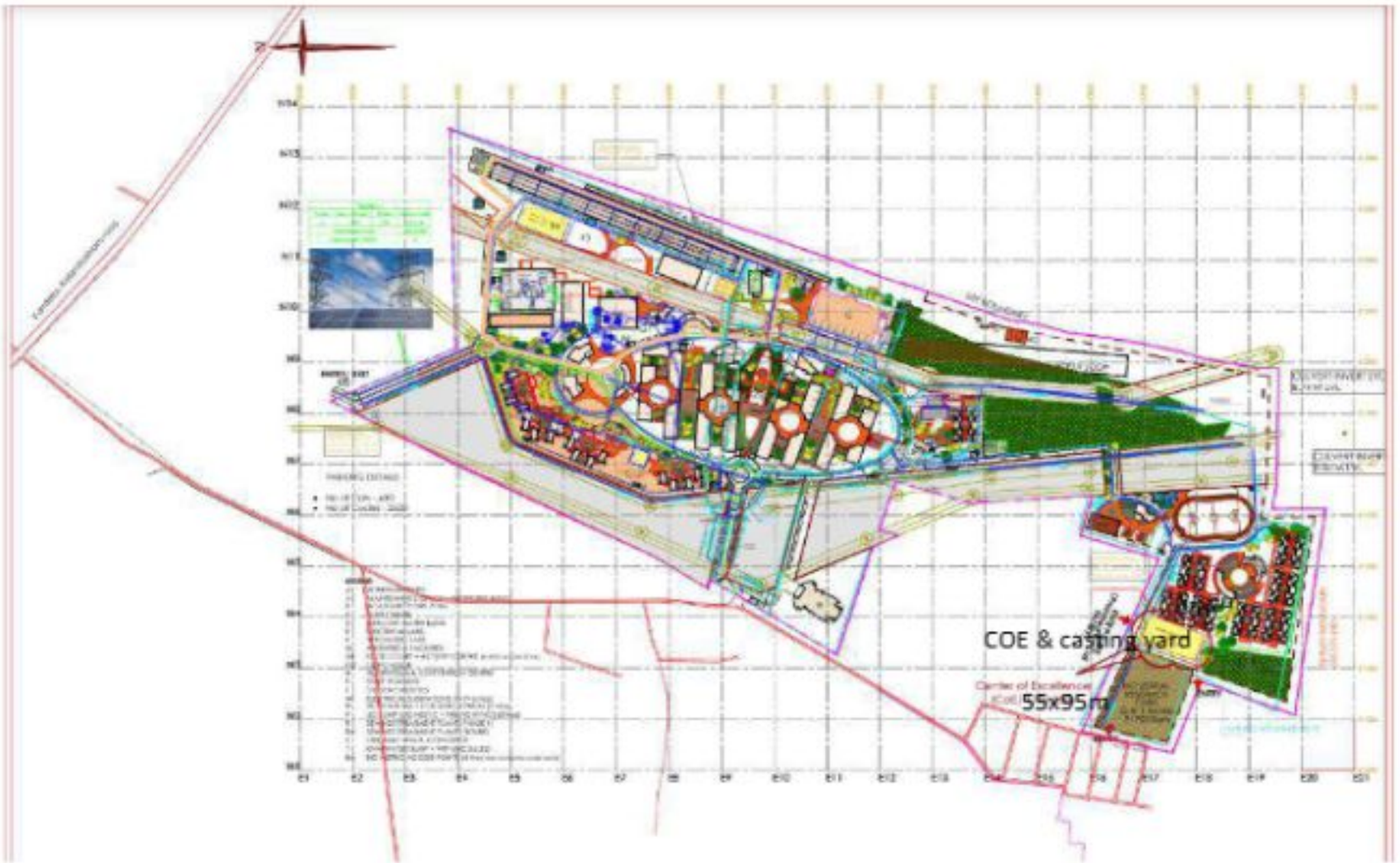
IITM Discovery Campus
Thaiyur, Chennai

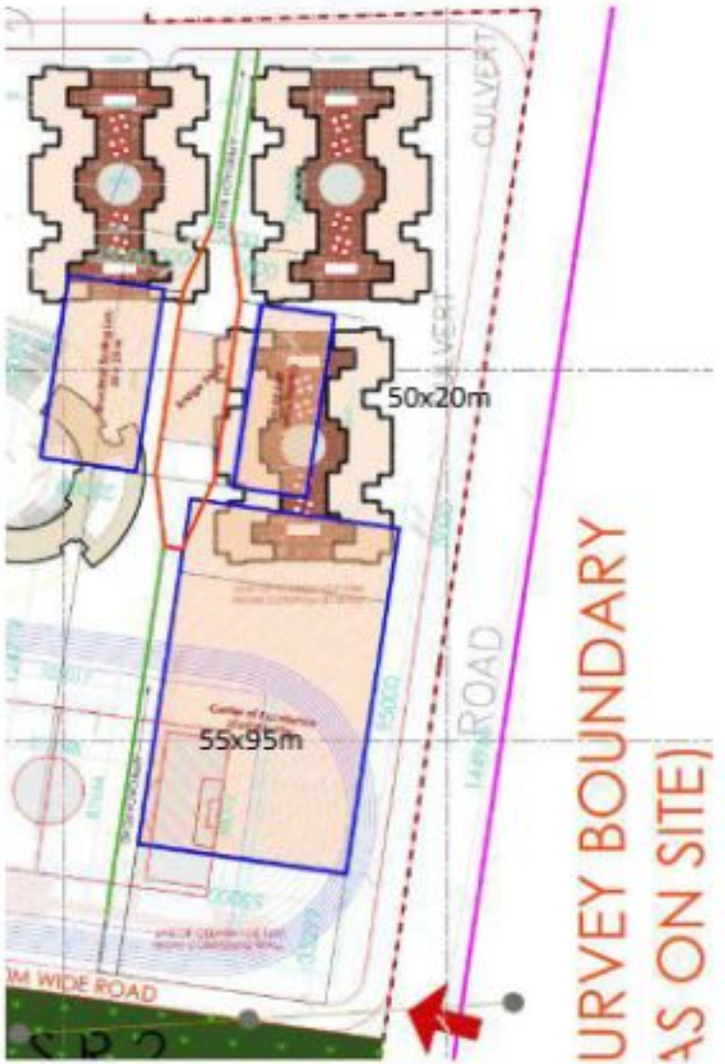
Strengthen academia-industry relationship

- Scaling up
- Demonstration Projects
- Training and capacity building



Tentative Master plan of Thaiyur campus





Elements of the TLC2EC

S.No	Details	Budget Estimate (Crore Rupees)
1	Built-up Facilities (Building, MEP, Smart systems)	25
2	Full-Scale Solar-Energy-Based Waste Beneficiation Plant	5
3	Physical Test Bed	25
4	Smart Classroom, Virtual Test Bed, and LCA Lab	15
5	Opex (Maintenance of Assets, Staff Salaries, Operations of Training Programs) for 5 Years	25
6	Contingency	5
	Total	**100**

Elements of the TLC2EC - Details

Elements of the Physical Test Bed

A. Pilot Plant for Solar-Enabled Thermal Treatment for Recycled Concrete Aggregates
B. Testbed on Aggregates
C. Testbed on cement production
D. Sophisticated Instruments Lab, Mechanical and Durability Lab
E. Integrated mini batching plant with 3D printing facilities

Smart Classroom - The experience center will host a state-of-the-art 80-seater smart classroom to enable a great learning environment for training sessions.

Virtual Test Bed

A. Construction Process Visualization and Optimization Lab
B. LCA Lab
C. Policy and Contract Management Lab

Co-Working Space for Start Ups - Providing a boost to deep-tech startups in the area of sustainable building technology, the experience center will host a co-working space for start-ups and run a mentorship program where selected start-ups can use the research facilities for quick development of their products

TLC2 Industry Consortium

SCC – Sustainable Construction Consortium

- Membership at 3 levels – Platinum (25), Gold (15) and Silver (5) (Figures in lakh per year for 3 years)
- Utilization of fee towards:
  - Salaries of research staff who will drive this partnership
  - Funding of projects related to TLC2 areas
  - Maintenance of equipment so that it is constantly available for the projects
  - Partial funding of internally organized events
- Benefits to the industry:
  - Get to define the type of research undertaken – objective is to solve the common current problems, and also innovations for the future; get to be part of RAB
  - Access to a large pool of researchers at IITM and other Indian institutions through IITM network; availability of students from these institutions for internships and placement
  - Two-way interaction of scientific personnel
  - Exclusive workshops / seminars for the industry member
  - Discounted registration to all TLC2 events and certification programs
  - (More as we evolve)

Benefits of collaboration

INDUSTRY

SUSTAINABILITY

TLC2

Connect with us

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https://tlc2.iitm.ac.in/