

CSIR - CBRI

At a Glance

Vision

To work as the world-class knowledge base for providing solutions to almost all area of Building Construction/Habitat Planning and Construction including Building Materials, Technology, Fire Engineering and Disaster Mitigation.



Mission

To carry out R&D on all aspects of Building and Housing and assist the Building Industry in solving problems of Planning, Designing, Foundations, Materials and Construction including Disaster Mitigation in all kinds of Buildings.

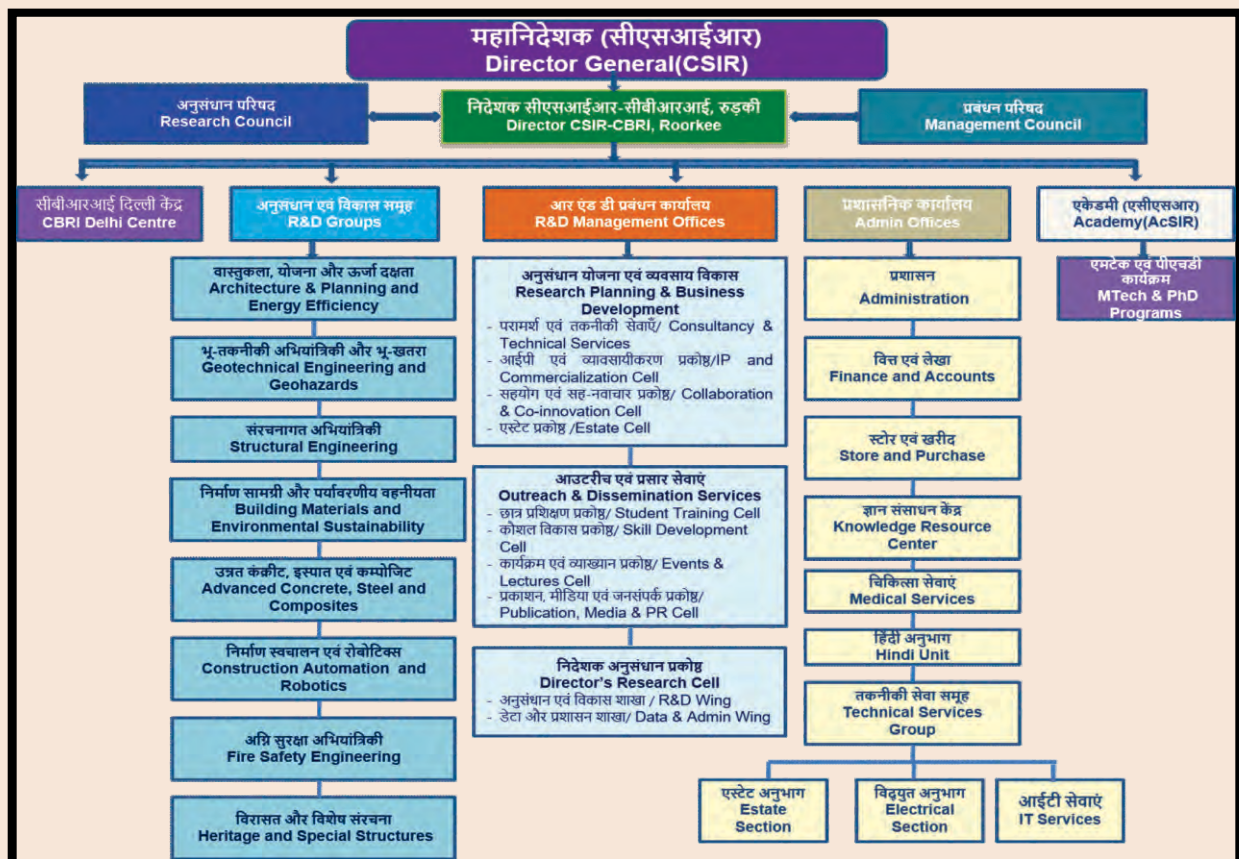




The Central Building Research Institute, Roorkee, India, has been vested with the responsibility of generating, cultivating and promoting building science and technology in the service of the country. Since its inception in 1947, the Institute has been assisting the building construction and building material industries in finding timely, appropriate and economical solutions to the problems of building materials, health monitoring and rehabilitation of structures, disaster mitigation, fire safety, Energy efficient rural and urban housing. The Institute is committed to serve the people through R&D in the development process and maintains linkages at international and national level.



CSIR-CBRI Organogram



Research & Development Groups

Advanced Concrete, Steel and Composites - R&D Areas

- ❑ Alternative Building Products and Process Development
- ❑ Value Added Building Products and Process Development From Wastes Including Stone/ C&D Waste
- ❑ Light Weight Concretes using Agro-Industrial Wastes
- ❑ Low Energy-Low Carbon Eco-Cementitious Clinker & Composite Cements/LC3/ Special Cements using Industrial Wastes
- ❑ Polymer- Cement Interaction and Stabilized Mud Composites
- ❑ Life Cycle Assessment, Microstructure & Hydration of Cementitious Materials
- ❑ Mathematical Modelling & Numerical Analysis to Develop Cost Effective Building Materials
- ❑ Performance Evaluation of Building Materials for Quality Improvement
- ❑ Corrosion Control Measures Such as Protective Coatings, Inhibitors and Cathodic Protection
- ❑ Seismic Resist Precast Concrete Joint Systems
- ❑ Heath Assessment for Structures and Preventive Measures for Life Enhancement
- ❑ Seismic Strengthening/Retrofitting of Masonry Structures/RC structures using TRC/TRM
- ❑ Seismic Resistant CFST based Fuse Connection Systems
- ❑ Suitability Assessment of Materials for Specific End Applications
- ❑ Foldable structures (Horizontal and Vertical expansion)
- ❑ Fire Retardant Collapsible shelters
- ❑ Rebar Couplers/ Mechanical splices
- ❑ Fiber Reinforced Concrete & Composites



Building Products using Waste Materials



Rebar couplers



Textile strengthening of Masonry structures



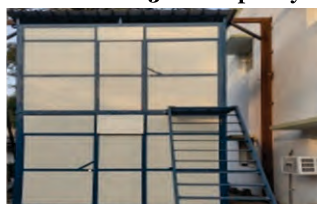
IPN Coating



CTM of 500 T capacity



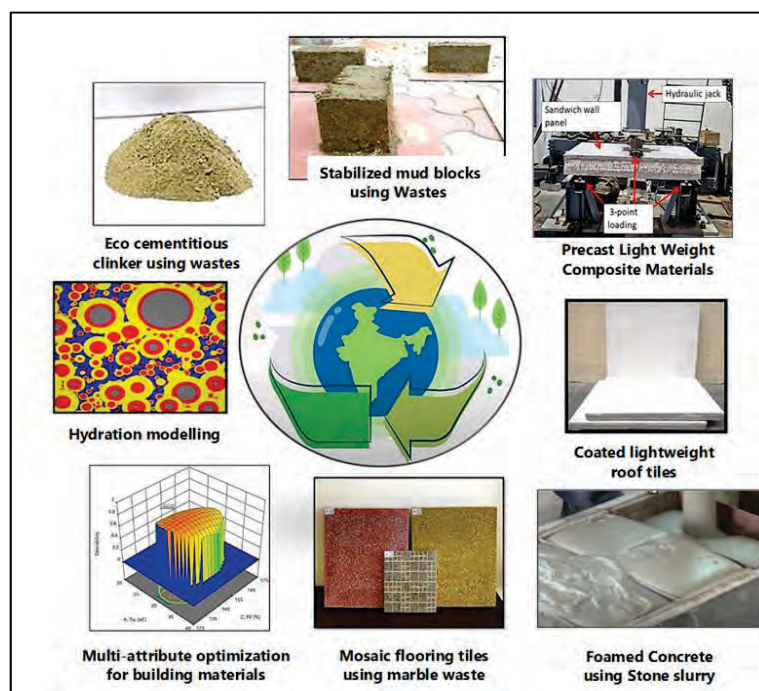
Foldable structures



Textile strengthening of BCJ



Fire Retardant Collapsible shelters

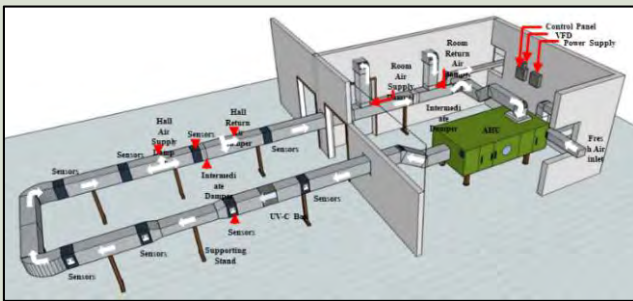


Architecture, Planning and Energy Efficiency- R&D Areas

Architecture & Planning



Wind Tunnel Testing Laboratory



Heating, Ventilation, and Air Conditioning Test Bed Facility



Real-Time Thermal Transmittance



Light Measurement System



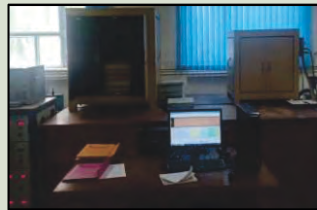
Rural Technology Demonstration Park

Energy Efficiency

- ☐ Air Quality in Buildings
- ☐ Building Energy Efficiency
- ☐ Climate Responsive Buildings
- ☐ Active and passive Heating, Ventilation, and Air Conditioning (HVAC) Systems
- ☐ Exergy & Thermo-Economics of Buildings



Heliodon



Thermal Conductivity Testing Apparatus



Energy Efficient Building Test Bed Park



Energy Efficiency Block APEE

Building Materials & Environmental Sustainability - R&D Areas

- ❑ Pollution monitoring of brick kilns
- ❑ Design of high draught brick kilns with zig-zag setting
- ❑ Design of gravitational settling chamber
- ❑ Silica and lime nano particles
- ❑ Structural pest and fungi management
- ❑ Tarunashak for prevention of unwanted trees on buildings
- ❑ Building Material Atlas of India
- ❑ Deserts sand bio-brick and mortar
- ❑ Gypsum-vermiculite-fly ash light weight plaster
- ❑ Fly ash sand lime bricks
- ❑ Waste to wealth: Phospho-gypsum, fly-ash desert sand and agro-industrial waste
- ❑ Materials development for heritage conservation
- ❑ Innovative building materials: 3D concrete printer, energy efficient, carbon based materials, low carbon materials and CO₂ utilisation
- ❑ Design and drawing of retrofitting emission control device for DG sets



Brick kilns



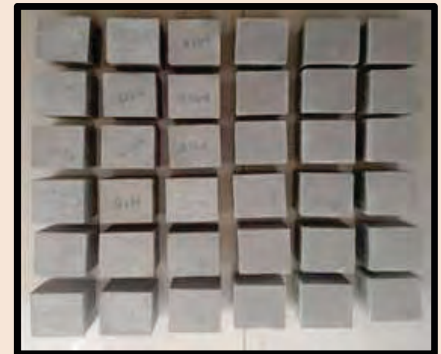
Tile from C&D Waste



Bricks from fly ash & red mud



Desert sand bio-bricks



Bio-mortar



Product to control unwanted trees



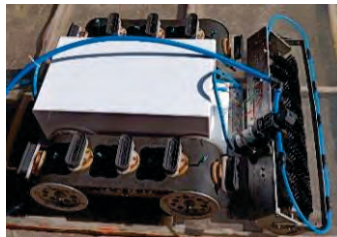
Wall putty from CCR waste

Construction, Automation & Robotics - R&D Areas

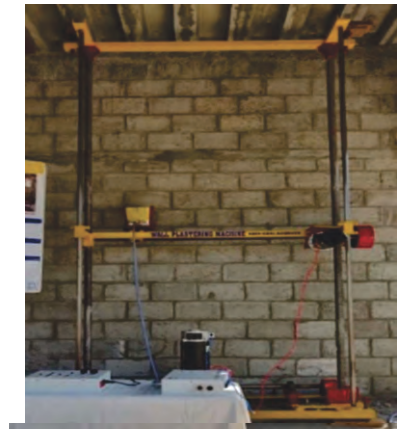
- ☐ Construction Mechanization, Automation
- ☐ Construction Robotics
- ☐ Structural Health Monitoring
- ☐ Additive Manufacturing
- ☐ Building Acoustics & Waste Management
- ☐ IoT, Sensor Development & Instrumentation



Climbing Robot for SHM



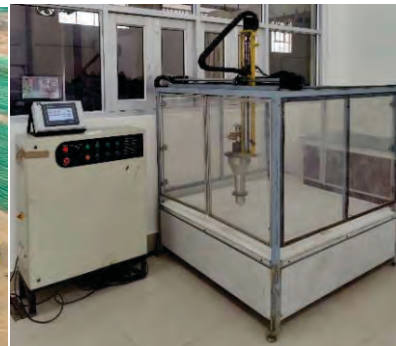
Glass Cleaning Robot



Wall Plastering Machine



Under Ground Boring Machine



Concrete Printer



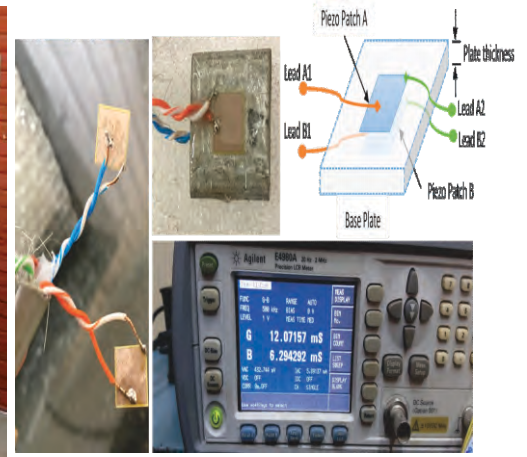
Modular Mobile Crane



Panel Making Machine



Brick Making Machine



Sensor Development



Agro-waste Building



Sewer Retrofitting System



Fire Rescue System

Fire Safety Engineering – R & D Areas

- ☐ Fire retardant combustible building materials
- ☐ Fire retardant natural and synthetic polymeric materials
- ☐ Fire resistant non-combustible building materials
- ☐ Fire resistant coatings and paints
- ☐ Fire retardant nano-materials
- ☐ Fire retardant and smoke suppressant materials
- ☐ Fire retardant intermittent linings and blocking layers
- ☐ Fire resistant intumescent coatings
- ☐ Design and development of passive fire protection systems
- ☐ Fire barrier system for electrical power cables
- ☐ Fire damper and air conditioning ducts
- ☐ Analytical modelling and fire spread simulation
- ☐ Extinguishments of hydrocarbon solvents and metals fire
- ☐ Burning behaviour of building materials
- ☐ Investigation on smoke and toxicity of combustion products
- ☐ Fire resistance investigation of structural building elements
- ☐ Investigation on fire retardant insulation lining materials
- ☐ Water-mist fire suppression/extinguishments
- ☐ Investigation on pre-flash-over fire in enclosures
- ☐ Post-fire analysis, investigation and restoration
- ☐ Fire safety audit of all categories of buildings
- ☐ Suitability & Application engineering - Sprinklers and Detectors
- ☐ Design of fire protection systems for buildings and industries



Vertical Wall Furnace



Vertical Wall Furnace



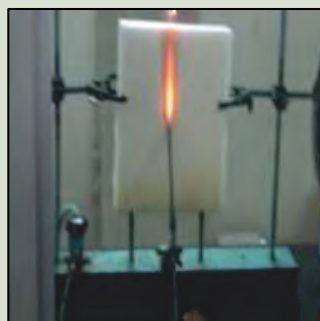
Horizontal Floor Furnace



Dual Cone Calorie Meter



Fire Retardant Water Repellent Canvas



Ignitability Evaluation of Materials



Fire Retardant Transparent Coating for Wood (Water based)



Fire retardant intumescent coating for steel and GI duct applications



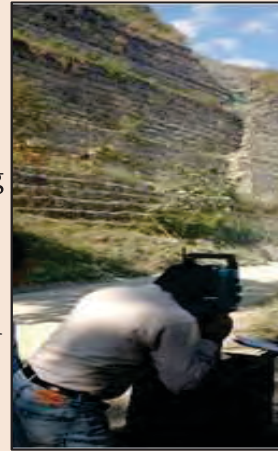
Toxicity Index Evaluation

Geotechnical Engineering & Geo-Hazards - R&D Areas

- ❑ Foundation Engineering
- ❑ Computational Geotechnics
- ❑ Geotechnical Earthquake Engineering
- ❑ Environmental Geotechnics
- ❑ Ground Improvement
- ❑ Landslide Mapping, Monitoring and Early Warning
- ❑ Geo-Hazards Mitigation Measures
- ❑ Underground Space and Tunnel Engineering
- ❑ Deep Learning and AI
- ❑ Near Surface Geophysics (MASW & ERT) and Subsurface Investigation

Facilities and Resources

- ❑ Digital Image Processing and GIS
- ❑ Test Flume for Debris Flow Modelling
- ❑ Uniaxial Shake Table
- ❑ Cyclic Triaxial & Consolidation Testing
- ❑ Geosynthetic Tensile Testing Machine
- ❑ Engineering Seismograph, Resistivity-meter and GPR
- ❑ Foundation Pile Diagnostic System
- ❑ Laser Particle Size Analyzer
- ❑ 2D-Digital Image Correlation System
- ❑ UAV for Landslide Mapping
- ❑ Robotic Total Station for Surveying and Monitoring
- ❑ MATLAB, RAMMS, FLAC3D, PLAXIS3D, GEOSLOPE, GEO5, UDEC, ArcGIS



Monitoring of RE Wall at Pakyong Airport, Sikkim



Debris Flow Experimental Facility

Major Contributions of National Importance & Societal Benefits

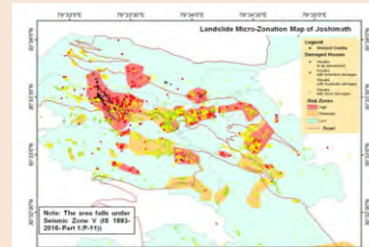
- ❑ Technical guidance on the safe demolition of Supertech Twin Tower, Noida
- ❑ Subsurface investigation, analysis of foundation schemes, site-specific ground response analysis and monitoring of Shri Ram Temple at Ayodhya, Uttar Pradesh
- ❑ Installation of landslide monitoring system at NLA site, Kohima, Nagaland
- ❑ Design of retaining and drainage structure at Pakyong Airport, Sikkim



Dynamic Tunnel-Soil-Structure Interaction Studies



Uniaxial Shake Table Facility



Post-Disaster Assessment & Risk Mapping of Joshimath



Electrical Resistivity Tomography (ERT)

Patents

- ❑ A pull-out device for soil nails and anchors
- ❑ An end openable anchor and its mechanism



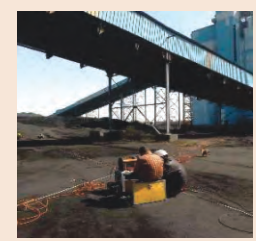
MASW at Shri Ram Janmbhoomi Mandir, Ayodhya



Field Study at Tawang, Arunachal Pradesh



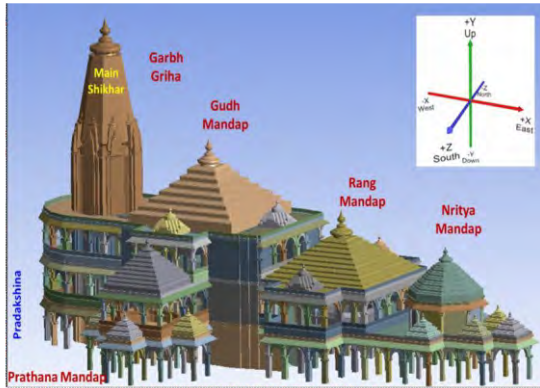
Landslide Mitigation & Monitoring System at NLA, Kohima



Rajiv Gandhi Thermal Power Plant, Hisar

Heritage & Special Structures - R & D Areas

Notable Contributions



Structural Design of Shri Ram Mandir Ayodhya



GPR Investigations at CSTM Building



Laser scanning of Sun Temple Konark



Structural Analysis of Taj Mahal



3D Geometry of Mahakaleshwar Temple



Point Cloud of Rashtrapati Bhawan



Flagpole Design Rashtrapati Bhawan, Nilayam

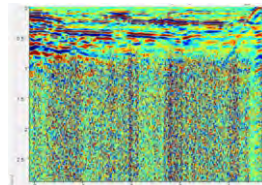


Thermal Imaging of Heritage Structures

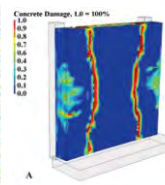
R&D Areas

- ❑ Heritage Conservation & Restoration
- ❑ Digital preservation of Structures
- ❑ Novel testing of masonry & RCC
- ❑ Hybrid Non Destructive Evaluation Structural Health monitoring, Novel, Compatible Restoration Techniques and Materials, AI / ML
- ❑ Wind Engineering, Interference Effect, Offshore Structures
- ❑ Building Demolition & Implosion Techniques
- ❑ Blast & Impact Analysis and Design
- ❑ Building facades/windows design, Cyclones, Codal development
- ❑ Wind Turbines, Safety of vital onshore and offshore Structures, Tsunami shelters, Temporary shelter
- ❑ Renewable Energy Infrastructure for Sustainable Future

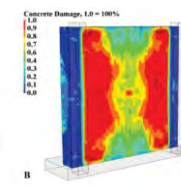
Expertise



GPR Imaging & NDT&E



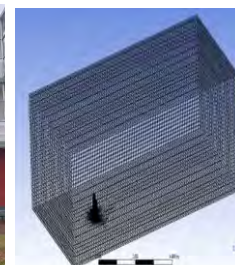
Blast Resistant Design



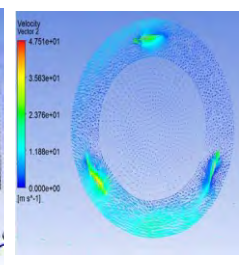
Building Implosion



Centre of Excellence on Indian Heritage Structures



CFD analysis of Tall buildings and VWAT



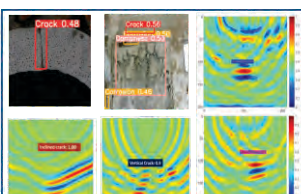
- ❑ **Projects of National Importance:** Mahakaleshwar Ujjain; Shri Ram Mandir Ayodhya; Kashi Viswanath; Rashtrapati Bhawan New Delhi; Taj Mahal Agra; Sun Temple Konark; Amer Fort Rajasthan; CSMT Mumbai; Chittorgarh fort; Qutub Minar; Monuments of Hampi, Jagannath Temple Puri; F.R.I. Building Dehradun ; National Archives of India Delhi; Old Delhi Railway Station Delhi; Dam Kothi Haridwar; Rashtrapati Ashiana Building Dehradun; Pant Sadan Nainital; UP Vidhan Sabha Lucknow; Flagpole at Rashtrapati Nilayam Hyderabad; Rashtrapati Niwas Shimla; Safe Demolition of Twin Tower Noida, Chintels Paradiso; ONGC Hazira Plant, AIIMS Rishikesh etc.



300T UTM and SHM of using FBG, VWSG etc.



Software developed for Concrete and Masonry imaging



Assessment using ML assisted multi wave techniques



Technology for retrofitting



Web Portal for damage assessment

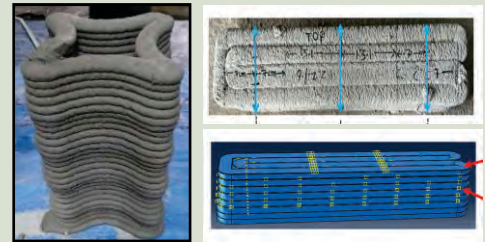


Laboratory Experiments

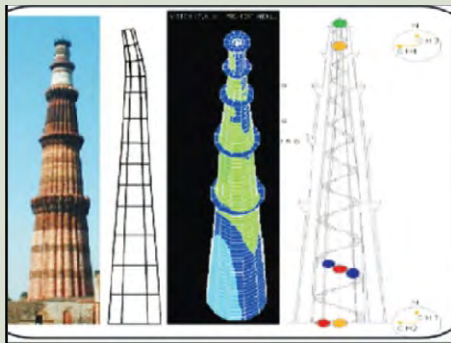


Structural Engineering. - R & D Areas

- ❑ Confined Masonry, Prefab Precast Building Systems
- ❑ Full Scale Experimental Investigation
- ❑ Climate Change Buildings
- ❑ Distress Diagnosis, Condition Assessment & Non-destructive Testing of Structures
- ❑ Health Monitoring of Civil Infrastructures
- ❑ 3D Concrete Printing of Building Infrastructures
- ❑ Structural Composites for Construction, Retrofitting and Strengthening
- ❑ Cold form Steel Construction, 3D Volumetric Construction
- ❑ Effect of Blast Loading on Structures
- ❑ Suggestions of Remedial Measures for Distressed Infrastructures
- ❑ Damage Survey, Categorization, Repair, Strengthening and Retrofitting Measures
- ❑ Disaster Recovery & Rehabilitation
- ❑ Vibration Monitoring of Plants and Structures
- ❑ Design of High Performance Concrete, Analysis & Design of Multi-Storey Buildings
- ❑ Safety and Reliability Analysis of Structures
- ❑ Seismic Disaster Resiliency



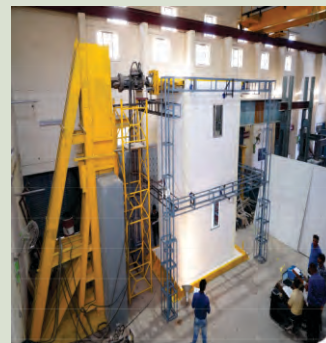
3D Concrete Printing



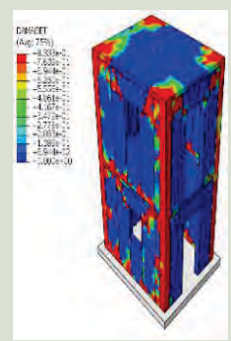
Health Monitoring of Qutub Minar



Full Scale Testing of 3D Volumetric Construction



Full Scale Testing of Interlocking Blocks Building



Repairing Technique of Masonry Building



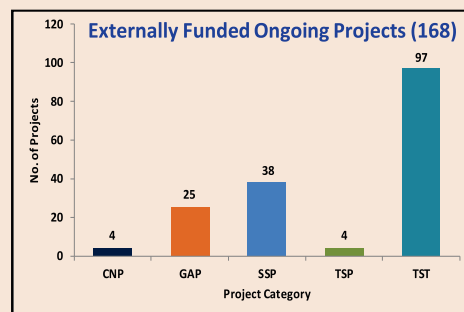
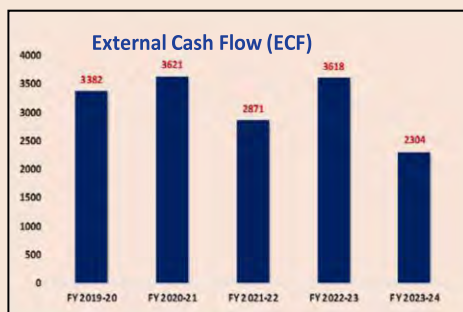
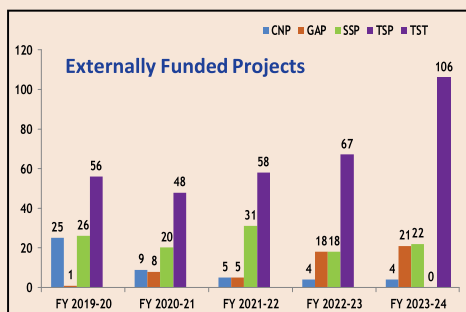
300 T UTM Facility



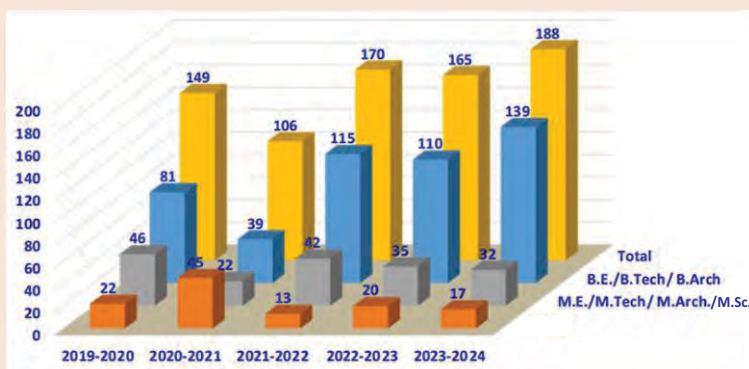
Full Scale Testing of Confined Masonry

Performance Indicators

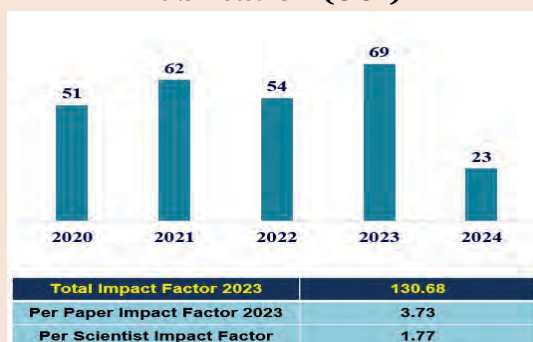
Externally Funded Projects, External Cash Flow and Ongoing Projects



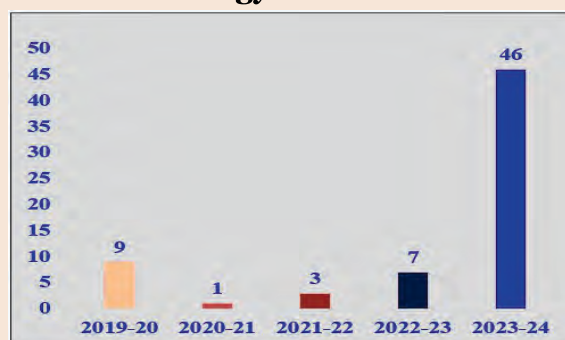
Skill Development



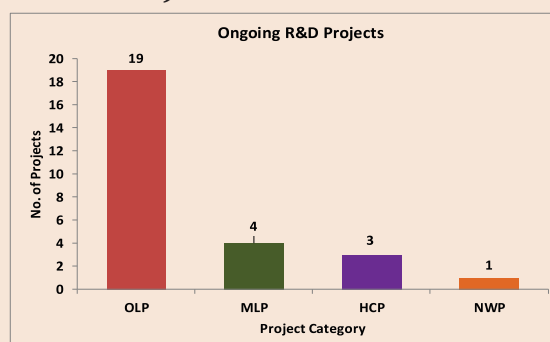
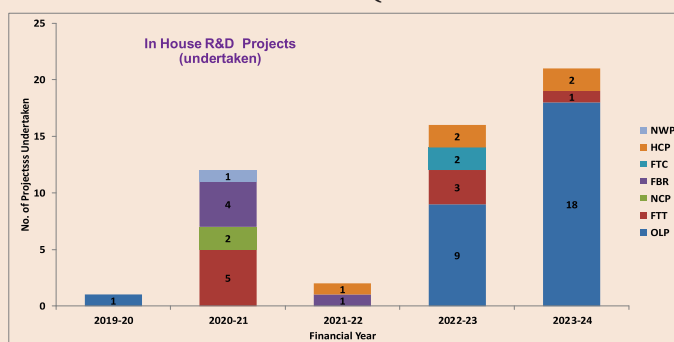
Publication (SCI)



Technology Transferred



R&D Projects (CSIR Coordinated and In-house)



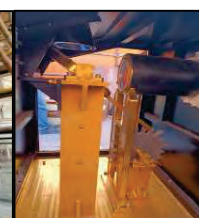
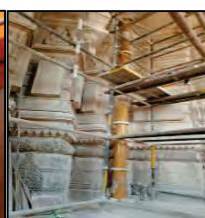
Till 31st March 2024



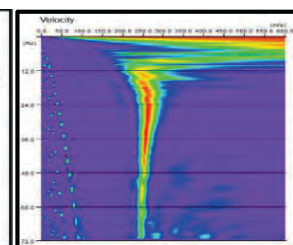
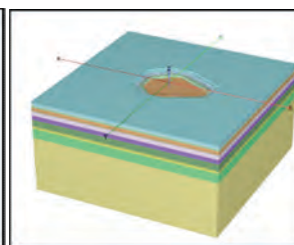
CSIR-CBRI Major Projects Highlights



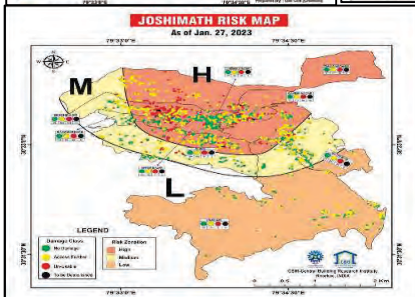
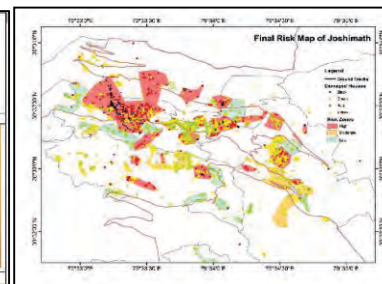
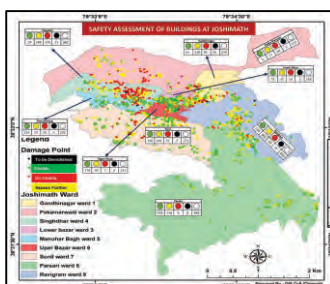
Covid – 19 Makeshift Hospital



Surya Tilak at Shri Ram Temple, Ayodhya



3-D Structural Analysis and Design of Shri Ram Temple, Ayodhya & Subsurface investigation, analysis of foundation schemes, site-specific ground response analysis and monitoring of Shri Ram Temple at Ayodhya UP.



Mitigation, Recovery & Reconstruction of Subsidence Zone in Joshimath

विस्तृत जानकारी हेतु कृपया सम्पर्क करें / For further details please contact:

निदेशक/ Director

सीएसआईआर- केन्द्रीय भवन आनुसंधान संस्थान, रुड़की 247667(उत्तराखंड)

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