DON BOSCO COLLEGE OF ENGINEERING

Fatorda, Goa - 403 602

DEPARTMENT OF CIVIL ENGINEERING

2024-2025

"EcoVille – 2k25"

.....way towards Sustainable Development

From the HOD's Desk:

It is a great pleasure to bring out the project idea book "EcoVille – 2k25" that we launched so enthusiastically in the year 2020 which projects the implementation of innovative ideas considering their impact on the environment.

Civil Engineering is one of the oldest engineering disciplines and aims at facilitating the life for the society and in general making the world a better and more civilized place to live. It is the most versatile and core branch of Engineering comprising of structural Analysis & Design, Geotechnical, Irrigation and water resources, Transportation, Construction and Environmental Engineering etc. In our department students are encouraged to participate and present their project work in National and International conferences. Students are also motivated to participate in project competitions organized at National level to enhance their presentation and communication skills along with technical knowledge. Our graduates are exceptionally well prepared for challenging careers, handling major projects and being on the fast track towards new heights in their careers.

Release of "EcoVille – 2k25", a project idea book of Civil Engineering department is an attempt to improve industry institute interaction.

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CONTENT

Domain of project: Quality Education

EXPERIMENTAL VERIFICATION ON THE USAGE OF FIBRE IN RIGID PAVEMENTS

***Domain/Area of Interest*:** *High Performance Concrete Pavements*

Project Guide: *Asst. Prof. B R Anirudha*

Project Members:

Mr. Harshdeep Naik
Mr. Prathamesh Bhonsle
Mr. Caden Gonsalves Mr. Pranil Naik
Mr. Mohammad Shahid Sheikh

Brief Idea of project: *Development is increasing at a very faster pace, it is our duty to make it an efficient and effective one. Concrete roads are very durable when compared to asphalt-bitumen roads. However there are certain drawbacks that arise with the construction of concrete roads. In this project we try to lower these drawbacks and make the concrete roads much efficient so that it delivers the purpose and serves to the people utilizing the same.*

The project focus on introducing fibre made of polypropylene in Rigid Pavements that is roads and increase its strength with a grade of concrete of M30 and achieve a higher strength, and also increase the durability of concrete roads by lessening the cracks formation leading to a much better quality development of roads that work as a mode of transport for connecting the different parts of the country.

***Applications*:**

- *Industrial and heavy-duty roads construction*
- *Jointless concrete pavements*
- *Highway shoulders and median strips*
- *Expansion and contraction crack control*
- *Precast concrete panels and paving slabs*
- *Cost effective replacement for steel fibers and reduced corrosion issues*
- *Higher tensile strength and enhanced durability*

PERFORMANCE EVALUATION OF RC STRUCTURES IN DIFFERENT SEISMIC ZONES

Domain/Area of Interest: *Structural Engineering*

Project Guides: *Dr. Neena S. P. Panandikar,*
Asst. Prof. Genevieve Fernandes

Project Members:

Mr. Krish Sharma
Mr. Kshitiz KC
Mr. Satyendra Satyavan Naik
Mr. Yohan Lourenco Antao
Mr. Avon Jaslon Carvalho

Brief Idea of project

This study investigates the seismic response of an 11-storey reinforced concrete (RC) building subjected to vertical irregularities with fixed base and base isolation. Three types of vertical irregularities, namely stiffness, geometry and mass irregularities are considered and the seismic response in terms of storey displacement, storey drift, storey shear and overturning moment are evaluated using response spectrum analysis for different seismic zones.

Applications:

- ***Improved Structural Design for Irregular Buildings***

The findings help structural engineers design safer and more efficient RC buildings with vertical irregularities by providing insights into how different types of irregularities affect seismic behavior.

- ***Optimization of Base Isolation Systems***

The comparative results between fixed-base and base-isolated structures assist in optimizing the placement and design of base isolators for mid-rise buildings in seismically active regions.

- ***Development of Design Guidelines for Vertical Irregularities***

The study can contribute to codal recommendations (IS 1893:2016) by providing empirical data on the impact of vertical irregularities, supporting the development of specific provisions for mass, stiffness, and geometry irregularities.

- ***Educational and Research Reference***

The study serves as a valuable reference for academic institutions, aiding students and researchers in understanding the influence of vertical irregularities and base isolation in seismic design.

Awards and Participation: *ICC IDEA 2025, 2ND INTERNATIONAL CONFERENCE ON CIVIL ENGINEERING. SRM UNIVERSITY, CHENNAI.*

HARNESSING GIS MAPPING FOR SUSTAINABLE URBAN DEVELOPMENT AND DIGITAL INTEGRATION

Domain/Area of Interest: *Sustainable Development*

Project Guide: *Asst. Prof. Satyesh Kakodkar*

Project Members:

Ms. Angel Rodrigues
Ms.Clarita Theresa Liane De Souza
Mr. Rohan Joseph Viegas
Ms. Rachel Fernandes

Brief Idea of project

This project focuses on the application of Geographic Information Systems (GIS) and Digital Elevation Models (DEM) to support infrastructure planning, water distribution analysis, and flood risk mitigation in a selected rural settlement. The primary objective was

to develop a spatially intelligent digital model of the area that could be used to simulate surface water flow, assess pipeline alignment, evaluate hydraulic performance, and identify flood-prone zones.

Through a combination of field data collection, GNSS-based elevation surveying, CAD modeling, and spatial analysis, the project digitized key infrastructure components such as road networks, water pipelines, and valve points. Chainage-based segmentation was applied along road corridors to analyze runoff coefficients, discharge rates, and terrain-driven flow accumulation.

The final output was a comprehensive, GIS-integrated infrastructure model designed to serve as a decision-support tool for local planners and engineers, promoting resilient infrastructure development, efficient water resource management, and terrain-informed drainage planning.

Applications:
Infrastructure mapping and planning using spatial data.
Optimization of water distribution through elevation-based pipeline modeling.
Identification of flood-prone areas using DEM and terrain analysis.
Chainage-based runoff estimation for targeted drainage planning.
Simulation of surface water flow for hydrological assessment.
Creation of a digital twin model of the study area.
Support for decision-making by local authorities and engineers.
Assessment of slope and road profiles for resilient infrastructure design.
Enhancement of data-driven planning using GIS-CAD integration.
Promotion of sustainable development through terrain-sensitive planning.

Awards and Participation: Gomantak Awards, 3rd Place, GCCI Startup UatraAwardd 2nd place

SOIL STABILIZATION USING RICE HUSK ASH, SUGARCANE BAGASSE, CONSTRUCTION AND DEMOLITION WASTE

Domain/Area of Interest: *Soil Stabilization Using Rice Hush Ash, Sugarcane bagasse ,Construction and Demolition waste.*

Project Guide: *Asst. Prof. Swaroopa Sail*

Project Members:
Miss. Aditi Vengurlekar
Mr. Kedar Phadte
Mr. Preet Mhamal
Miss. Siddhi Sawant
Mr. Shubham Verlekar

Brief Idea of project:

This study evaluates the effectiveness of using sustainable waste materials— sugarcane bagasse ash (SCBA), rice husk ash (RHA), and construction & demolition (C&D) waste—for soil stabilization. Laboratory tests revealed that RHA and C&D waste significantly improved soil properties, particularly at 10–12% mix ratios, while SCBA showed moderate effects. RHA performed best in Atterberg limits and moisture content, and 12% C&D yielded the highest shear strength. The research highlights the environmental and engineering benefits of using industrial and agricultural byproducts as eco-friendly alternatives to conventional stabilizers, supporting circular economy goals in geotechnical applications like roadways and embankments.

***Applications*:**

Soil stabilization of lateritic soil.

A BIM-BASED STUDY ON THE DIGITAL DOCUMENTATION OF STRUCTURES

Domain/Area of Interest: *Building Information Modelling*

Project Guide: *Asst. Prof. Jeffrey Valadares*

Project Members:

Ms. Ruisha Chari
Ms. Purva Kankonkar
Mr. Harsh Kambli
Ms. Ranchita Kauthankar
Ms. Sejal Gorekar

Brief Idea Of The Project

The project emphasizes digitally documenting existing structures, especially heritage buildings, using Autodesk Revit and AutoCAD. It

involves creating detailed 3D models with structural, RCC, MEP, and reinforcement details, along with cost estimation. This documentation supports preservation, maintenance, and disaster recovery. Two structures, including a Portuguese house, were modeled. ETABS was employed for structural analysis, and Revit MEP for internal systems.

Applications

1. *Disaster Recovery and Restoration*
2. *Heritage and Cultural Conservation*
3. *Smart Documentation for Maintenance*
4. *Civil and Structural Engineering Design*
5. *Educational and Training Purposes*
6. *Government and Urban Planning*
7. *Facility Management and Lifecycle Tracking*
8. *Digital Twin and Virtual Reconstruction*
9. *Permit and Regulatory Approvals*
10. *Energy Analysis and Sustainable Design*

PREDICTION OF SHEAR STRENGTH PARAMETERS USING BASIC SOIL PROPERTIES

Domain/Area of Interest: Geotechnical Engineering

Project Guide: Dr. Shwetha Prasanna

Project Members:

Mr. Abdul Baseer Dalal
Mr. Ashish Dhuri
Mr. Brendon Rodrigues
Mr. Sunraj Naik Gaonkar
Mr. Yashdeep Naik

Brief Idea of the project

This project aims to estimate soil shear strength parameters — cohesion (c) and angle of internal friction (ϕ) — using basic and easily measurable soil properties like moisture content, density, Atterberg limits, grain size, and soil type. The shear strength parameters are critical for the stability analysis of slopes, retaining walls, foundations, embankments, etc. Instead of performing costly and time-consuming tests like direct shear or triaxial tests, the project develops empirical or statistical models to predict these values based on lab-tested data. Accurate determination is essential for safe and economic designs.

Applications

It allows for quick and cost-effective estimation of shear strength parameters during preliminary site investigations, reducing the need for time-consuming laboratory tests. It is especially useful in remote or difficult-to-access areas where full testing isn't feasible. It is useful in rural infrastructure, residential foundations, road embankments and irrigation structures where full scale testing is not affordable. The predictive models developed can support the design of foundations, slopes, and retaining structures by providing essential strength data from basic soil properties. Additionally, it proves valuable in emergency situations for rapid soil stability assessments. and serves as a useful tool for academic research and teaching in soil mechanics.

STRENGTH PERFORMANCE OF ALKALI ACTIVATED SLAG CONCRETE

Domain/Area of Interest: *Construction Materials, Concrete*

Project Guide: Dr. Nitendra Palankar

Project Members:

Mr. Mohammed Juneed Nargund
Mr. Mohammed Rihan Kittur
Mr. Mohammed Sahil Shaikh
Mr. Prem Vadlar
Mr. Saad Ibrahim Doddamani
Mr. Nihar Dhavalikar

Brief Idea of project:
This project aims to investigate the mechanical strength properties of alkali activated slag concrete (AASC), which serves as an eco-friendly substitute for conventional Ordinary Portland Cement (OPC) concrete.
The primary objectives of this study are to Examine the compressive strength, and flexural strength of AASC at various curing ages, including 7 days and 28 days. Compare the strength characteristics of AASC with those of traditional OPC concrete. Analyze the impact of varying alkali concentrations. Evaluate both the early-age and long-term strength development of the concrete mixes. Assess the potential of AASC in minimizing carbon dioxide emissions and utilizing industrial by-products effectively.

Applications: *Alkali Activated Slag Concrete (AASC) can be used in various areas such as precast products like blocks and tiles, pavements, roads, and industrial floors. It is also suitable for marine structures, coastal projects, and sewage systems due to its chemical resistance.*

Awards and Participation: —

EVALUATION OF HYDROPONICS SYSTEMS FOR DOMESTIC SEWAGE TREATMENT USING LOCALLY AVAILABLE

Domain/Area of Interest: *Environmental Engineering*

Project Guide: *Asst. Prof. Prachi Dessai*

Project Members:

Mr. Bigesh Velip
Ms. Jecila Caldeira
Mr. Ranganath Shet
Ms. Sanjana Gaude
Mr. Tirtesh Paryekar

Brief Idea of project:

This project studies how hydroponic systems growing plants in water without soil can be used to clean domestic sewage in an eco- friendly way. Different plants were tested to see how well they remove pollutants like BOD, COD, and turbidity. The aim is to create a low-cost, simple, and green method for treating wastewater, especially in places with limited space and resources.

Applications:

Treated water can be reused for gardening.

EXPERIMENTAL STUDIES OF DIFFERENT CURING METHODS ON COMPRESSIVE STRENGTH OF ULTRA HIGH-PERFORMANCE CONCRETE

***Domain/Area of Interest*:** *Ultra High Performance Concrete*

Project Guide: *Asst.Prof. Shruti Jambhale*

Project Members:

Mr. Gopalkrishna Parab
Mr. Houston Andrade
Mr. Nimay Palyekar
Mr. Samarth Fadte
Mr. Shreyas Surve
Mr. Yatin Harmalkar

Brief Idea of project

This research focuses on studying how different curing methods (normal curing, self-curing, and accelerated curing) affect the compressive strength of Ultra High Performance Concrete (UHPC). By testing strength at specific time intervals (3, 7, 14, and 28 days), the study aims to identify which method gives the best results while being practical for real- world use. The goal is to provide useful data to help improve curing techniques for better performance of UHPC in construction projects.

Applications

- *Used in bridge components (decks, joints, girders) for durability and strength*
- *Ideal for high-rise buildings due to high load-bearing capacity*
- *Common in precast elements like facade panels and cladding*
- *Effective for repair and strengthening of existing structures*
- *Suitable for marine and coastal structures due to corrosion resistance*
- *Applied in defense and security structures for blast resistance*
- *Used in architectural elements for thin, complex, and aesthetic designs*
- *Helps in transport infrastructure like pavements, tunnels, and platforms*

DESIGN OF GRADE M200 OF ULTRA HIGH-PERFORMANCE CONCRETE FOR ADDITIVE

Domain/Area of Interest: *Concrete Technology*

Project Guide: Asst. Prof. Satyesh Kakodkar

Project Members
Mr. Aaryan Raut
Mr. Fasil Firos
Ms. Mushk Sheikh
Ms. Freida Sequeira

Brief Idea of project:

- *Design a **printable UHPC mix** with M200 strength using micro/nano additives (e.g., silica fume, fibers).*

- *Optimize **rheological properties** (thixotropy, yield stress) for extrusion and layer bonding.*
- *Characterize mechanical performance (compressive/flexural strength, durability).*
- *Demonstrate feasibility via **small-scale 3D-printed prototypes** (e.g., architectural elements, structural components).*

Applications

- *Custom Architectural Elements:*
  UHPC enables freeform 3D-printed façades and decorative panels without the need for costly formwork.
- *Bridges & Footbridges:*
  Lightweight, high-strength UHPC allows for the printing of durable pedestrian bridges with complex geometries.
- *Structural Repairs:*
  UHPC can be directly 3D-printed on-site to repair damaged infrastructure like bridges and tunnels quickly.
- *Historical Preservation:*
  UHPC enables precise replication of damaged heritage elements with superior durability for long-term conservation.
- *Modular Housing:*
  Strong and low-cost homes can be rapidly 3D-printed using UHPC for improved structural performance.
  Smart Infrastructure:
  UHPC structures can integrate embedded sensors during printing for real-time monitoring and data collection.

Awards and Participation: **MSME 2025**

Working Model:

EXPERIMENTAL INVESTIGATION ON SELF CURING CONCRETE BY PARTIAL REPLACEMENT OF AGGREGATES WITH QUARRY DUST AND COCONUT

Domain/Area of Interest: Concrete Engineering

Project Guide: Asst. Prof. Kaushik V. Pai Fondekar

Project Members:
Mr. Bhasker Gain
Mr.Rajat Kashalkar
Mr.Sidhesh Gaonkar
Mr. Ruben Rodrigues
Mr.Sakaullah Mirza

Brief Idea of the project

This project aims to develop and analyze a sustainable, self-curing concrete by partially replacing traditional aggregates with quarry dust (as a fine aggregate replacement) and coconut shell (as a coarse aggregate replacement). It also investigates the potential of internal curing agents to facilitate self-curing, reducing the dependence on external water curing. In conventional concrete, curing is essential for strength gain and durability.

However, in situations where proper curing is difficult (e.g., remote areas or structures with limited water access), self-curing concrete offers a practical solution. This study focuses on using environmentally friendly materials and industrial waste (quarry dust and coconut shell), promoting green construction and reducing environmental impact.

Applications

Ideal for regions where water for curing is limited or unavailable. Useful in arid or drought-prone locations. Promotes eco- friendly building practices by utilizing waste materials (quarry dust and coconut shells). Reduces reliance on natural aggregates, conserving natural resources. Beneficial in precast elements like blocks, pipes, and pavers where external curing is difficult. Offers a cost-effective concrete solution using locally available waste materials. Useful in rural housing and affordable housing schemes.

Can be used in non-structural concrete applications like footpaths, medians, and low-load pavements. Suitable for tunnels, bridges, and retaining walls where continuous water curing is challenging.

Reduces permeability and cracking due to self-curing, making it potentially useful in marine environments. Projects using such sustainable concrete can contribute to LEED or GRIHA ratings by reducing carbon footprint. Provides a practical method to manage and reuse quarry dust and agricultural waste (coconut shells), reducing landfill disposal.

Department of Civil Engineering
Don Bosco College of Engineering, Fatorda, Goa

Vision

To be the Center of Excellence in Civil Engineering Education and Consultancy by providing holistic, innovative and research centric environment and keeping pace with rapidly changing technologies.

Mission

- To impart quality education in civil engineering, through effectiveness and innovation in teaching and learning.
- To promote positive interactions among faculty and students and foster networking with alumni, industry and other stakeholders.
- To train young minds in soft skills, intellectual and ethical strengths, conducive to globally competitive environment.
- To motivate students for research and entrepreneurship in relevant sectors of society with focus on excellence and creativity.
- To undertake sponsored research and provide consultancy services in all the areas of civil engineering beneficial to the community.