

Department of Civil Engineering
Updated Roll List of session 2024-25 (8th Semester) Attendance

Group No	Roll No.		Name of Students	Min
1	21024129	Dr. Adheesh Kumar Vivek	RUDRA PRATAP	FOOD DELIVERY RIDER's SAFETY : THE FOCUS IN COMPLIANCE OPERATION
	21024108		BABLU YADAV	
	19102250		MAHENDRA YEKKUDU	
2	21024115	Mr. Prakhar Modi	MONALISA	Morphometric analysis of Mahanadi river basin
	21024146		AKRITI SAGAR	
3	21024137	Dr. Balbir Pandey	SHUSHANT KUMAR SINHA	Response of soft clay to electrokinetic treatment
	21024127		RAVI KUMAR	
4	21024147	Dr. Kundan Meshram	ARYAN SAURABH	Smart Road Care: Multimodal Pothole Detection and Maintenance Optimization
	21024141		VINAY KHAROLE	
5	21024114	Mr. Vinod Kumar	MD SUHAIL AKHTAR	Effect of stone column on an embankment construction
	21024107		ATUL CHOUDHARY	
6	21024112	Prof. M. Chakradhara Rao	KAJAL KUMARI	pushover analysis of multi storeyed building
	21024111		HIMANI CHANDRAKAR	
7	20102035	Dr. Sonal Banchhor	NITIN SHARMA	CONCRETE WITH INDUSTRIAL WASTE (FLY ASH) FOR THE DEVELOPMENT OF SUSTAINABLE CONCRETE
	21024140		VIKAS MEENA	
8	21024105	Dr. Nikhil Kumar Verma	ANKIT KUMAR BHARDWAJ	A Study on the properties of LC ³ Concrete
	21024102		AJAY CHOUDHARY	
9	21024118	Mr. Rochak Pandey	NITI KUMARI	Prediction model for LC3
	21024120		NIVEDITA MARKO	

10	21024106	Dr. Ashish Kumar Parashar	ANKIT KUMAR MISHRA	Impact on rainfall run-off from Kusmunda Opencast Mining
	21024113		MANENDRA KASARE	
	21024126		RAMPRATAP CHAUDHARY	
11	21024119	Dr. Umank Mishra	NITIN ANAND	Vehicle Detection and Adaptive Traffic Signal Control Using AI
	21024117		NIRAJ KUMAR	
	21024124		RAHUL KUMAR VISHWAKARMA	
12	21024136	Ms. Ayushi Nayak	SHUBHAM RAJPUT	EFFECT OF WASTEWATER ON CONCRETE PROPERTY
	21024109		BIPENDRA NISHAD	
	21024135		SHUBHAM KUMAR	
13	21024133	Ms. Preeti Singh	SHEETAL	Sustainable Green building design project
	21024142		ERAM WARSI	
14	21024110	Dr. Bijoli Mondal	HEMA	WQI Assessment Of GGV Using GIS
	21024143		BRAHMA SHANKAR PANDEY	
15	21024104	Dr. VVS Surya Kumar Dadi	ANIKET RANJAN	Analysis Design and detailing of multistorey Residential Building
	21024123		PREM RANJAN SINGH	
	21024125		RAHUL SINGH	
16	21024103	Prof. R.K. Choubey	ANIKET KUMAR SINGH	THE PERFORMANCE EVALUATION OF FIBER REINFORCED CONCRETE USING HYBRID FIBER (STEEL & GLASS FIBER)
	21024139		SUSHANT KUMAR	
	21024121		PEMENDRA SAHU	
17	21024132	Prof. Shailendra Kumar	SAUGAT SINGH	Planning, analysis and designing of an integrated water supply system of ggv
	21024122		PIYUSH SINGH GOUR	
	21024131		SANSKAR KUMAR	

A Major Project Report

on

**ANALYSING THE CRASH RISK AND TRAFFIC OFFENSES AMONG GIG
ECONOMY MOTORISTS: A CASE STUDY ON FOOD DELIVERY RIDERS**

Submitted in partial fulfilment of the Requirements for Award of Degree of Bachelor of
Technology in Civil Engineering.

Submitted by :-

RUDRA PRATAP

(Roll no. : 21024129)

(Enroll no : GGV/21/01029)

BABLU YADAV

(Roll no. : 21024108)

(Enroll no : GGV/21/01008)

Under the guidance of

Dr. ADHEESH KUMAR VIVEK

(Assistant Professor)

Department of Civil Engineering



Session : 2024-25

DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES, ENGG. & TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University established by the Central University Act 2009 No 25 of 2009)



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University established by the Central University Act 2009 No 25 of 2009)

CERTIFICATE

Certified that the minor project entitled "**ANALYSING THE CRASH RISK AND TRAFFIC OFFENSES AMONG GIG ECONOMY MOTORISTS: A CASE STUDY ON FOOD DELIVERY RIDERS**"

submitted by **Rudra Pratap and Bablu Yadav** in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (CG) is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature

Dr. Adheesh Kumar Vivek

(Supervisor)

Signature

(External Examiner 1)

Signature

(External Examiner 2)

Signature

Prof. M. Chakradhar-Rao

HOD

Department of Civil Engineering

School of Studies in Engineering & Technology, G.G.V

ABSTRACT

Food delivery riders are vulnerable road users frequently exposed to high traffic risks due to long working hours, time pressure, and unsafe road conditions. Their safety is often compromised by inadequate protective measures and limited legal protections while navigating busy urban environments. Food delivery riders (FDRs) have become an indispensable part of the urban transportation and logistics network, particularly with the increasing reliance on digital food delivery platforms. However, their role places them in a highly vulnerable position on roads due to prolonged working hours, strict delivery timelines, and challenging traffic environments. This study aims to investigate the safety issues faced by FDRs and identify key factors contributing to their exposure to road risks. To achieve this, a structured questionnaire was developed based on a comprehensive review of existing literature. The preliminary survey was conducted in Bilaspur city in two stages, capturing a range of responses from active food delivery riders. The questionnaire consisted of five primary constructs and several other independent variables designed to assess factors that potentially hamper the safety of riders.

Generalized Linear Modelling (GLM) was employed as the core analytical technique, given its effectiveness in modeling relationships between non-normally distributed dependent variables and various predictor variables. Additionally, Spearman correlation analysis was used to evaluate the strength of association between predictors and target variables. Three separate models were developed, each considering penalized traffic offences, crash involvement, and near-crash experiences as the respective target variables. The low standard error values in the regression outputs indicated minimal deviation from the expected regression coefficients, validating the robustness and fit of the models.

The results of the GLM, using a probability distribution function, revealed that rider age, the existing legal and regulatory framework, and levels of training and experience had the highest incidence rate ratios. These were identified as the most statistically significant predictors of crash risk among food delivery riders, alongside their own aberrant riding behaviors such as speeding, red-light jumping, and aggressive maneuvers. These findings underscore the critical influence of regulatory and behavioral factors on rider safety.

Based on the insights from the study, it is recommended that strict enforcement of road safety policies, including stringent penalties for traffic violations, mandatory training programs, and improvements in the legal framework, can play a vital role in reducing unsafe riding behaviors. Furthermore, raising awareness about road safety among delivery riders and platform companies can significantly mitigate crash risks. This research provides a strong empirical foundation for policymakers and stakeholders to design targeted interventions aimed at enhancing the safety and well-being of food delivery riders in urban areas.

A Major Project Report on

“THE MORPHOMETRIC INVESTIGATION OF THE MAHANADI RIVER BASIN: IMPLICATIONS FOR MANAGING SOIL AND WATER RESOURCES”

Submitted in partial fulfilment of the Requirements for Award of Degree of Bachelor of
Technology in Civil Engineering.

Submitted by:-

MONALISA

(Roll no: 21024115)

(Enroll no: GGV/21/01015)

AKRITI SAGAR

(Roll No: 21024146)

(Enroll no: GGV/21/01046)

Under the guidance of

Dr. PRAKHAR MODI

(Assistant Professor)

Department of Civil Engineering



Session : 2024-25

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GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G)

(A Central University established by the Central University Act 2009 No 25 of 2009)

CERTIFICATE

Certified that the major project entitled "THE MORPHOMETRIC INVESTIGATION OF THE MAHANADI RIVER BASIN: IMPLICATIONS FOR MANAGING SOIL AND WATER RESOURCES" submitted by Monalisa & Akriti Sagar in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (CG) is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature 02/05/2025

Dr. Prakhar Modi

(Supervisor)

Signature 02/05/2025

(External Examiner 1)

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(External Examiner 2)

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Prof. M. C. RAO

HOD

Department of Civil Engineering

School of Studies in Engineering & Technology, G.G.V

ABSTRACT

Morphometric analysis is a critical tool in understanding the hydrological and geomorphological behavior of a river basin. It involves the quantitative evaluation of basin characteristics using mathematical and GIS-based approaches. This study aims to assess the morphometric parameters of the Mahanadi River Basin to evaluate its drainage characteristics, runoff potential, erosion risk, and flood vulnerability. The analysis was carried out using 30-meter resolution SRTM DEM data and processed in ArcGIS and QGIS environments. The basin covers an area of 141,589 km², with a basin length of 871.89 km, and is classified as a fifth-order drainage system. A total of 1103 stream segments were identified, showing a decreasing number with increasing stream order. The average bifurcation ratio was found to be 5.47, indicating strong structural control over drainage development. The drainage density (0.1228 km⁻¹) and stream frequency (0.007572 km⁻²) suggest a mature, well-drained basin with high infiltration capacity. Relief aspects reveal a total basin relief of 1326 meters, with a Melton Ruggedness Ratio of 3.4726 and a ruggedness number of 161.772, highlighting areas of steep terrain and high flood susceptibility. The low values of form factor (0.000573) and elongation ratio (0.0270) indicate that the basin is highly elongated, resulting in delayed peak discharge and longer flood durations. These results collectively indicate that while the basin generally supports infiltration and moderate runoff under normal conditions, the upper regions are highly susceptible to flash floods and erosion during intense rainfall. The findings serve as a valuable foundation for designing effective flood management, soil and water conservation, and sustainable watershed development strategies for the Mahanadi River Basin.

Keyword : *Morphologic parameters · Watershed planning · Digital elevation model*

A Major Project Report on

“RESPONSE OF SOFT CLAY TO ELECTROKINETIC TREATMENT”

Submitted in partial fulfilment of the Requirements for Award of Degree of
Bachelor of Technology in Civil Engineering.

Submitted by:-

SHUSHANT KUMAR SINHA

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(Enroll no : GGV/21/01037)

RAVI KUMAR

(Roll No : 21024127)

(Enroll no : GGV/21/01027)

Under the guidance of

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(Assistant Professor)

Department of Civil Engineering



Session: 2024-25

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SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G)

(A Central University established by the Central University Act 2009, No 25 of 2009)

CERTIFICATE

Certified that the minor project entitled "RESPONSE OF SOFT CLAY TO ELECTROKINETIC TREATMENT" submitted by **Shushant Kumar Sinha & Ravi Kumar** in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (CG) is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature
Dr. Balbir Kumar Pandey
(Supervisor)

Signature
(External Examiner 1)

Signature
(External Examiner 2)

Signature
Prof. M. C. RAO
HOD

Department of Civil Engineering
School of Studies in Engineering & Technology, G.G.V

Abstract

With the unprecedented global population explosion, land is in high demand more than ever, especially to meet the rising needs of urbanization and construction. Utilizing land is important; hence, it has put the focus on the need for advanced soil improvement and restoration practices. There are several new methods, of which electrokinetic treatment has emerged as a very effective one in recent years. This method is crucial to maintain soil quality and optimize its potential to support sustainable development due to growing pressures in a global population. In this study, the response of soft clay due to electrokinetic treatment was investigated using commercially available software COMSOL Multiphysics. The voltage gradients of 0, 0.5, 1, and 2 V/cm were applied to investigate the critical metrics, including electroosmotic flow motion, velocity, TDS concentration, and ohmic heating during the treatment process. The response of soft clay behaviours was studied at different voltages and for different durations. From this study, it is observed that the electric field and the electric field norm show a linear relationship with the potential gradient. Further, the temperature gradient increases with an increase in voltage gradient, and the maximum value is observed at the bottom of the soft clay in the vicinity of the electrode. The surface concentration of soft clay TDS also shows an increment with an increase in voltage gradient and treatment time.

A
Major Project Report
On
**Smart Road Care: Multimodal Pothole Detection
and Maintenance Strategy**

Submitted by:

ARYAN SAURABH

ROLL No -21024147
Enrollment No. – GGV/21/01047

VINAY KHAROLE

ROLL No - 21024141
Enrollment No. – GGV/21/01041

Department of Civil Engineering 4th Yr. (8th Semester)

Under the Guidance of
Dr. KUNDAN MESHRAM
(Assistant Professor)



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING AND TECHNOLOGY,
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SESSION 2024-25

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TECHNOLOGY GURU GHASIDAS VISHWAVIDYALAYA,
BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of
2009)



CERTIFICATE

Certified that the major project entitled "Evaluation of the Pavement Condition Index for Urban Roads" submitted by ARYAN SAURABH AND VINAY KHAROLE in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, Institute of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under supervision and guidance.

K. Mesram

Dr Kundan Mesram
(Assist. Prof.)

[Signature]
04/05/2025

Examiner 1

[Signature]
02/05/2025

Examiner 2

[Signature]
02/05/25

Prof. M. Chakradhara Rao
Head of Department
Civil Engineering Department,
School of Studies in Engineering and Technology
Guru Ghasidas Vishwavidyalaya

ABSTRACT

Potholes are a persistent issue in road infrastructure, leading to increased maintenance expenses, safety hazards, and traffic disruptions. Traditional methods for pothole detection, such as manual visual inspection and sensor-fitted survey trucks, are often non-scalable, inefficient, and time-consuming. This research presents an integrated approach for pothole detection and maintenance prioritization, combining deep learning, artificial intelligence (AI), and Geographic Information System (GIS) technologies. By leveraging Convolutional Neural Networks (CNNs) with architectures like MobileNetV2 and ResNet50, the system effectively detects potholes and classifies their severity into Low, Medium, and High categories, achieving an accuracy of 89%. The model integrates fuzzy logic to prioritize maintenance based on factors such as severity, area, and perimeter of potholes, along with the Pavement Condition Index (PCI). Additionally, QGIS is employed to spatially map and visualize the potholes, enabling real-time, targeted resource allocation. The results show the model's ability to accurately assess and classify road defects, with data collected from Bilaspur, Chhattisgarh, resulting in a PCI value of 93.6523, highlighting the effectiveness of the proposed methodology.

This AI-driven framework offers a scalable, cost-effective solution for road monitoring, providing valuable support for infrastructure management in smart cities by enabling data-driven decision-making for road maintenance and safety planning. The implementation of real-time data collection, along with the incorporation of deep learning techniques, promises to further enhance the system's accuracy and scalability, facilitating proactive maintenance strategies. The approach is highly suitable for addressing the challenges posed by deteriorating road infrastructure, minimizing long-term repair costs, and mitigating the harmful impacts of potholes on safety and mobility. Future advancements, including the use of sensors and drones, will improve the precision and application of this system, offering a robust solution to modern road maintenance.

**PERFORMANCE OF STONE COLUMNS WITH A GEOCELL LAYER
OVERLAY ON SAND IN SOFT SOIL UNDER EMBANKMENT
LOADING**

**A Major Project report submitted in partial fulfilment of the requirement for the award
of the degree of**

**BACHELOR OF TECHNOLOGY
IN
CIVIL ENGINEERING**



VIII Semester

Md Suhail Akhtar (21024114)

Atul Choudhary (21024107)

Under the Guidance of

**Mr. Vinod Kumar
(Assistant Professor)**

**DEPARTMENT OF CIVIL ENGINEERING
(SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY)
GURU GHASIDAS VISHWAVIDYALAYA**

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

Koni, Bilaspur Chhattisgarh – 495009, India

Session 2024-25



DEPARTMENT OF CIVIL ENGINEERING

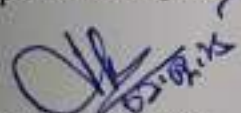
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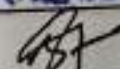
(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the major project report entitled "**PERFORMANCE OF STONE COLUMNS WITH A GEOCELL LAYER OVERLAY ON SAND IN SOFT SOIL UNDER EMBANKMENT LOADING**" submitted by **Md Suhail Akhtar and Atul Choudhary, B. Tech 8th Semester**, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.


Mr. Vinod Kumar
(Guide)

External Examiner 1: 

External Examiner 2: 

External Examiner 3: 


Prof. M. Chakradhara Rao
Head of Department
Department of Civil Engineering
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ABSTRACT

The construction of embankments over soft clay soils presents significant geotechnical challenges due to the low shear strength, high compressibility, and poor drainage characteristics of such soils. To mitigate these issues, stone columns have emerged as an effective ground improvement technique. However, their performance can be further enhanced through the use of lateral confinement mechanisms such as geocell encasement. This study investigates the effectiveness of stone columns encased with a geocell layer placed above a sand drainage bed in improving the stability and performance of embankments built over soft soil.

A three-dimensional finite element analysis was carried out using PLAXIS 3D, incorporating a staged construction process to simulate embankment loading over a layered soil system. The model consisted of an embankment structure, a 0.75-meter-thick sand layer, and a 9.25-meter-thick soft clay deposit. Stone columns of 1.0 meter in diameter were modelled within the clay, and two geocell configurations with stiffness values of 3500 kN/m and 4500 kN/m were introduced at the interface between the sand and clay layers. The study compared three scenarios: (i) stone columns without geocell layer, (ii) with 3500 kN/m geocell, and (iii) with 4500 kN/m geocell.

The results demonstrated that geocell layer significantly improves the load-settlement behaviour of the embankment system. Settlement at the embankment crest was reduced by 23.79% and 24.8% for the 3500 and 4500 kN/m geocell configurations, respectively, indicating that the majority of improvement occurs with moderate stiffness. The load-settlement curves indicated increased system stiffness and delayed onset of plastic deformation in reinforced cases. Moreover, the inclusion of geocell layer facilitated faster dissipation of excess pore water pressure, leading to enhanced consolidation and stability over time. Strength reduction analysis further confirmed the increase in factor of safety with geocell inclusion.

In conclusion, the integration of a geocell layer has offer a robust and efficient solution for improving the bearing capacity and reducing settlement in soft soil foundations. The study identifies an optimal range of geocell stiffness beyond which the performance gains become marginal, providing a cost-effective design recommendation for geotechnical engineers.

Non-Linear Pushover Analysis of Multi-Storeyed Building

A Major Project

Submitted in partial fulfillment of the requirements for the award of the

of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

by

KAJAL KUMARI

HIMANI CHANDRAKAR

Under the Guidance

Of

Dr. M. CHAKRADHARA RAO

Professor



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES, ENGG. & TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No.25 of 2009)

2024-25

DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA,

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Session 2024-2025



CERTIFICATE

This is to certify the major project work entitled "**NON-LINEAR PUSHOVER ANALYSIS OF MULTI-STOREYED BUILDING**" presented by **Kajal Kumari (21024112)** and **Himani Chandrakar (21024111)**, students of B. Tech VIII semester, Civil Engineering Department, GURU GHASIDAS VISHWAVIDYALAYA, has been completed successfully and satisfactorily.

This project report is submitted in partial fulfillment of the requirement for the award of the Degree of Bachelor of Technology, SOS, Engineering & Technology, GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G).

We wish success in all future endeavors to graduating students.

Signature.....

Dr. M. Chakradhara Rao

Professor (Supervisor)

Signature.....

External Examiner - 1

Signature.....

External Examiner - 2

Signature.....

Dr. M. Chakradhara Rao

Head of Department

Civil Engineering Department

ABSTRACT

This study evaluates the seismic performance of reinforced cement concrete (RCC) building of varying heights, i.e., 4, 5, 6 storeys through comprehensive pushover analysis. Performance-based seismic design, a key approach in modern structural engineering, emphasizes achieving specific performance objectives under different levels of earthquake intensity. In this context, pushover analysis serves as a nonlinear static analysis method that provides critical insights into how structures behave during seismic events, particularly in terms of their capacity to undergo plastic deformations and absorb seismic energy. The study evaluates these buildings based on key parameters such as pushover curves, performance points, and ductility demand, offering a detailed comparison of their seismic performance.

The observed drift in the case of elastic analysis for pushover curves for the 4, 5, and 6 storey building models, i.e. Model 1, Model 2, and Model 3 shows that the drift is in the permissible limits (< 0.004) in all the storeys, as the base shear for design basis earthquake (DBE) is approximately 10 times smaller than the base shear of maximum considered earthquake (MCE).

Additionally, the findings emphasize that as building height increases, both ductility demand and deformation capacity rises, requiring advanced seismic design strategies to ensure structural resilience and safety, particularly in taller buildings. This study underlines the importance of performance-based seismic design in effectively managing the complex seismic behavior of buildings with different number of storeys.

The hinge formations for different buildings show the points where the building starts yielding with increasing lateral loads due to an earthquake. It indicates the weak zones or under-designed members. As some of our buildings fall in the collapse prevention region, it indicates we need to redesign those failed members for new models and use retrofiting techniques for old models to regain their strength.

A Major Project Report
on
**Bio-CONCRETE WITH INDUSTRIAL WASTE (FLY ASH) FOR THE
DEVELOPMENT OF SUSTAINABLE CONCRETE**

Submitted in the partial fulfillment for the award of degree of
Bachelor of Technology in Civil Engineering

by
Nitin Sharma
Vikas Meena
B. Tech, VIIIth Semester

Under the Guidance of
Dr. Sonal Banchhor



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University)
SESSION 2024-25



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the minor project entitled "Bio-CONCRETE WITH INDUSTRIAL WASTE (FLY ASH) FOR THE DEVELOPMENT OF SUSTAINABLE CONCRETE" submitted by Nitin Sharma and Vikas Meena in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, is accorded to the students' own work, carried out by them in the Department of Civil Engineering during session 2024-25 under supervision and guidance.

Signature _____

Dr. Sonal Banchhor
Assistant Professor
Project Supervisor

Signature _____

(External Examiner/s)

Signature _____

M. Chakradhara Rao
Head of Department
Department of Civil Engineering
SOS, Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.)

ABSTRACT

Fractures in concrete are unpreventable, and also it's intrinsic weak point of concrete. By means of the splits, bath among others salts can easily run. It initiates oxidation, even further lowering the lifetime on the concrete. Therefore, there seemed to be a necessity to create an intrinsic bio material, a self-repairing method which is able to rectify the splits as well as fissures produced within concrete. Bio-concrete is a substance which could effectively rectify fractures within concrete. This particular method is extremely appealing as the pastime of break remediation is natural and eco-friendly. The undertaking covers the plugging of man-made break of cement concrete by using *Bacillus megaterium*, *Bacillus subtilis*, *Bacillus sphaericus*, *Bacillus pasteurii* etc, the impact on compressive toughness, drinking water absorption as well as liquid permeability of cement concrete cubes as a result of the blending of bacteria also is talked about within this specific task. It was actually discovered that the usage of *Bacillus Megaterium* as well as *Bacillus subtilis* advances the compressive power as well as stiffness of concrete. Additionally, it demonstrates that there's decrease in water absorption as well as liquid permeability in comparison with traditional concrete. The bacteria that are likely to be created with concrete must have the home of alkali resistance also additionally, it need to develop endospore, such which it is able to stand up to the stresses manufactured in concrete while blending, placing and transporting. This particular analysis is focused on look into the suitability of blending these self-healing calcite depositing bacteria with concrete with fly ash to be able to boost the compressive sturdiness of concrete, bring down its seepage and permeability of water by bio mineralization procedure. Sizable increased power is found to concrete examples when casted with bacterial fix. The analysis has invented ways or methods to evaluate the outcome of utilization of bacteria in concrete. Outcomes are in contrast to typical concrete. Natural adjustments of building substances are definitely the demand on the hour for long term and strength improvement sustainability. In this project bacteria is used, the research is carried out by using M25 grade concrete with replacement of 2.5%, 5%, 7.5%, 10%, Bacteria by keeping Fly ash as 5%, 7.5%, 10%, 12.5% constant and is carried out to determine the optimum percentage of replacement at which maximum compressive strength is achieved, the properties of the material are analyzed.

“STUDY ON THE PROPERTIES OF LC³ CONCRETE”

Major Project Report

**Submitted in the partial fulfilment for the award of degree of
Bachelor of Technology in Civil Engineering**

by

**Ankit Kr. Bhardwaj (21024105)
Ajay Choudhary (21024102)**

B. Tech VIII Semester

Under the Guidance of

Dr. Nikhil Kumar Verma



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

**(A Central University established by the Central Universities Act No. 25 of
2009)**

Session 2024-2025



DEPARTMENT OF CIVIL ENGINEERING

**SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)**

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the major project entitled "STUDY ON THE PROPERTIES OF LC³ CONCRETE" submitted by ANKIT KR. BHARDWAJ and AJAY CHOUDHARY, B. Tech VIII Semester, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering & Technology, GGV, Bilaspur is accorded to the students' own work, carried out by them in the department of civil engineering during session 2024-25 under my supervision and guidance.

Sign

Dr Nikhil Kumar Verma
Guide

Sign

External Examiner

Sign

Prof. M. Chakradhara Rao
Head of Department
Civil Engineering

School of Studies of Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.)

ABSTRACT

Global warming is a threatening issue in recent times and the cement industry also contributes to CO₂ emissions. This necessitates the alternative construction materials to lessen the carbon emission, and to attain the sustainable development. One such is the LC³ concrete, a concrete formed by blending limestone and calcined clay in the normal ordinary Portland cement. The present investigation has been carried out to study the workability, compressive strength, split tensile strength, ultrasonic pulse velocity and Sorptivity index on a concrete with different proportions of cement replaced by LC². The tests were carried out on M35 grade concrete with replacements of cement (by wt.) with LC² as 15%, 25%, 35% and 45% taking both limestone and calcined clay constant at 5% in each mix and varying calcined clay and limestone by 10% in each mix. Also, with LC² as 25%, 30%, 35%, 40%, 45% taking calcined clay constant at 20% and varying the limestone by 5% to 25% in each mix and again with LC² as 15%, 20%, 25%, 30%, 35% taking limestone constant at 10% and varying the calcined clay by 5% to 25% in each mix. With the advent of material like LC² in the concrete, the concrete started to change its property on further more replacements of cement with different amounts of LC² in an increasing order by weight. The compressive strength gave the maximum value at 35%, whereas the split tensile strength and ultrasonic pulse velocity (UPV) values kept gave maximum value at 35% and 25% LC² further decreases. Workability of the concrete decreases with addition of calcined clay and limestone. Sorptivity value decreases with addition of calcined clay and limestone indicates the durability of the concrete increases. From the experimental results it can be concluded that the replacement of cement by 25% and 35% LC² had shown better performance than the replacement of cement by limestone and calcined clay in all the mixes. With the use of LC³ helps to protect the environment by CO₂ emissions.

Keywords: Ultrasonic Pulse Velocity (UPV), Limestone Calcined Clay (LC²), Carbon Dioxide (CO₂), Global Warming

PREDICTION OF COMPRESSIVE STRENGTH OF LIMESTONE CALCINED CLAY CEMENT USING ARTIFICIAL NEURAL NETWORK

A Major Project

Submitted in partial fulfillment of the requirements for the award of the

of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

by

NIVEDITA MARKO (21024120)

NITI KUMARI (21024118)

B.TECH VIII SEMESTER

Under the Guidance

Of

Mr. ROCHAK PANDEY

Assistant Professor



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No.25 of 2009)

2024-25

**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA,
BILASPUR (C.G)**

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

Session 2024-2025



CERTIFICATE

This is to certify the major project work entitled "**PREDICTION OF COMPRESSIVE STRENGTH OF LIMESTONE CALCINED CLAY CEMENT (LC³) USING ARTIFICIAL NEURAL NETWORK**" presented by **Nivedita Marko (21024120) and Niti Kumari (21024118)**, students of B. Tech VIII semester, Civil Engineering Department, GURU GHASIDAS VISHWAVIDYALAYA, has been completed successfully and satisfactorily.

This project report is submitted in partial fulfillment of the requirement for the award of the Degree of Bachelor of Technology, SOS in Engineering & Technology, GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G).

We wish success in all future endeavors to graduating students.

Signature.....

Mr. ROCHAK PANDEY

Assistant Professor (Supervisor)

Signature.....

External Examiner - 1

Signature.....

External Examiner - 2

Signature.....

Dr. M. Chakradhara Rao

Head of Department

Department of Civil Engineering

ABSTRACT

The prediction of compressive strength of cementitious materials is critical for ensuring the quality, durability, and performance of construction materials. This study focuses on developing an Artificial Neural Network (ANN) model to predict the compressive strength of Limestone Calcined Clay Cement (LC³) mortar using MATLAB. LC³ is a sustainable alternative to traditional Portland cement, incorporating calcined clay and limestone, thereby reducing carbon emissions without compromising mechanical performance.

Experimental data were collected from various LC³ mortar mix designs by varying key parameters such as the proportion of clinker, calcined clay, limestone, water-to-binder ratio, and curing period. The collected dataset was preprocessed, normalized, and divided into training, validation, and testing sets. A feed-forward backpropagation ANN was developed and trained using different types of algorithms are used. Hyperparameters such as the number of hidden neurons and activation functions were optimized to achieve the best model performance.

The trained ANN model demonstrated high accuracy in predicting compressive strength, with low Mean Squared Error (MSE) and a (R) value. The results confirm the potential of machine learning models like ANN to serve as reliable, efficient tools for predicting the performance of sustainable construction materials. This approach can significantly reduce the time and cost associated with experimental testing.

A Major Project Report on

“To Study the Surface Runoff and its Impact on groundwater level from Kasmunda Opencast Coal Mines in Korba, Chhattisgarh”

**Project Report Submitted in Partial Fulfillment of Academic Requirement
for the Award of Degree of**

BACHELOR OF TECHNOLOGY In CIVIL ENGINEERING

Submitted by:

ANKIT KUMAR MISHRA
(Roll No.: 21024106)
(Enroll No.: GGV/21/01006)

MANENDRA KASARE
(Roll No.: 21024113)
(Enroll No.: GGV/21/01013)

Under the guidance of

Dr. ASHISH KUMAR PARASHAR
(Associate Professor)



DEPARTMENT OF CIVIL ENGINEERING

**SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)**

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

2024 - 2025



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,

GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the project report entitled **"To Study the Surface Runoff and its Impact on groundwater level from Kusunda Opencast Coal Mines in Korba, Chhattisgarh"** submitted by Ankit Kumar Mishra and Manendra Kasare in partial fulfillment of the requirements of the award of degree of Bachelor of Technology, Department of Civil Engineering, School of Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya Bilaspur is accorded to the student's own work, carried out by him in the Department of Civil Engineering during session 2024-2025 under my supervision and guidance.

Sign.....

Dr. Ashish Kumar Parashar

Sign.....

Examiner(s)

Prof. M.C. Rao

Head of Department

Civil Engineering Department,

School of Studies in Engineering and Technology

Guru Ghasidas Vishwavidyalaya

ABSTRACT

Present study comprehensively assesses the hydrological consequences of extensive opencast coal mining in the Kusmunda Coalfield, located in the Korba district of Chhattisgarh, India. Over the past decade, rapid mining expansion has significantly altered the land use and land cover (LULC) of the region, triggering environmental degradation and affecting the natural hydrological cycle. The research focuses on evaluating changes in surface runoff and groundwater levels between 2017 and 2024, driven by these anthropogenic alterations.

To quantify these changes, remote sensing and Geographic Information System (GIS) techniques were integrated with the Soil Conservation Service-Curve Number (SCS-CN) method. Multi-temporal satellite imagery was used to classify LULC, and hydrological the analysis revealed a significant increase in mining area from 13.03% to 23.29%, with a corresponding decrease in forest and agricultural land from 22.87% to 11.3%. These changes led to an increase in the Curve Number value from 84.74 to 86.22, resulting in greater surface runoff during monsoon periods—from 1372.7 mm in 2017 to 1392.03 mm in 2024. Groundwater monitoring data from the Central Ground Water Board (CGWB) indicated a consistent decline in pre-monsoon water levels in nearby monitoring stations such as Hardibazar and Mudiyanar, highlighting the impact of reduced recharge and continuous dewatering practices. Groundwater analysis further supports these observations. Pre-monsoon water levels at CGWB monitoring stations—particularly Hardibazar and Mudiyanar—showed a consistent decline over the study period. This trend is attributed to two key factors: reduced natural recharge due to land cover changes, and ongoing dewatering practices used to maintain dry mining conditions. The hydrological imbalance created by such practices poses long-term risks to water security, agriculture, and ecological stability in the surrounding areas.

The study underscores the critical need for sustainable mining practices to mitigate adverse hydrological impacts. Recommended measures include post-mining land reclamation, rainwater harvesting systems, afforestation programs, regulated overburden management, and real-time monitoring of groundwater extraction. Implementing such strategies can help restore the natural hydrological regime and ensure ecological resilience.

**SMART SIGNAL TIMING FOR URBAN
INTERSECTIONS USING REAL-TIME VEHICLE
DETECTION AND PCU CALCULATIONS**

**Project Report Submitted in Partial Fulfillment of Academic Requirement for the
Award of Degree of**

**BACHELOR OF TECHNOLOGY
IN
CIVIL ENGINEERING**

Submitted By

NIRAJ KUMAR (21024117)

NITIN ANAND (21024119)

RAHUL KUMAR VISHVAKARMA (21024124)

Under The Guidance of

DR. UMANK MISHRA

Associate professor



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established by the Central University Act 2009 No. 25 of 2009)

2024 - 2025



**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND
TECHNOLOGY,**

GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the project report entitled "Smart Signal Timing for Urban Intersections Using Real-Time Vehicle Detection and PCU Calculations"

submitted by **NIRAJ KUMAR, NITIN ANAND, RAHUL KUMAR VISHVAKARMA** in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Civil Engineering, Department of Civil Engineering, School of Studies in Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, is accorded to the student's own work, carried out by him in the Department of Civil Engineering during the session 2024-2025 under my supervision and guidance.

Sign.

**DR. UMANK MISHRA
ASSOCIATE PROFESSOR
& GUIDE**

Sign.

EXTERNAL EXAMINER 1

Sign.

EXTERNAL EXAMINER 2

Sign.

**Prof. M. Chakradhara Rao
Head of Department
Civil Engineering Department,
School of Studies of Engineering and Technology
Guru Ghasidas Vishwavidyalaya
Bilaspur, Chhattisgarh**

ABSTRACT

Managing traffic in busy city areas has become one of the biggest challenges due to the rapid increase in the number of vehicles. Traditional traffic signals that work on fixed time cycles often fail to adapt to real-time traffic conditions, leading to unnecessary delays and congestion. This project, titled "Smart Signal Timing for Urban Intersections Using Real-Time Vehicle Detection and PCU Calculations,"

aims to provide a more responsive and practical solution to this problem.

The project is divided into two main parts. In the first part, we used video-based vehicle detection techniques using YOLOv5 and the SORT tracking algorithm to identify and count different types of vehicles passing through each lane. These vehicles were then converted into standard traffic load units using Passenger Car Units (PCU) to make the data more useful for traffic analysis.

In the second part, we designed a signal timing model that takes these PCU values as input and calculates the green signal time for each lane dynamically. The algorithm ensures that every lane gets a minimum signal time and that the total cycle time adjusts based on overall traffic volume. This method not only improves traffic flow but also keeps the system fair and efficient.

This work is a step toward smarter, more adaptive traffic management systems and can be further developed to work with live traffic feeds in real-time environments.

Effect of wastewater on concrete properties

A Major Project Report submitted

To

Guru Ghasidas Vishwavidyalaya



In Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology in Civil Engineering

By

Shubham Rajput (21024136)

Shubham Kumar (21024135)

Bipendra Nishad (21024109)

Under the Guidance of

Ms. Ayushi Nayak

Assistant Professor

Department of Civil Engineering

April 2025

**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)**

DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University established by the Central Universities Act No. 25 of 2009)

CERTIFICATE

Certified that the Minor Project Report entitled "*Effect of Wastewater On Concrete Properties*" submitted by Mr. Shubham Rajput, Mr. Shubham Kumar, Mr. Bipendra Nishad of B.Tech 8th Semester, in partial fulfillment of the requirements for the award of degree in Bachelor of Technology (B. Tech) in Civil Engineering, is according to the students own investigation carried out by them in the Department of Civil Engineering, School of Studies in Engineering & Technology, GGV, during the session 2024-25.



(Signature of Supervisor)

Ms. Ayushi Nayak

Department of Civil Engineering



(Signature of Examiner)

.....
(Signature of HOD)

Prof. M. Chakradhara Rao

Department of Civil Engineering

ABSTRACT

Concrete has a vital role in development of infrastructure and living accommodation. Concrete is one of the most widely used construction materials, and water plays a crucial role in its production. The quality and quantity of mixing water significantly affect the concrete's strength, durability, and workability. In recent years, there's growing interest in using wastewater—such as from concrete plants or municipal/industrial sources—as a partial or full replacement for freshwater in concrete, due to increasing environmental and water scarcity concerns. This study investigates the effect of using wastewater on the properties of concrete. Wastewater samples were collected from Coal Washery and Plastic Factory Tifra. The collected wastewater samples were mixed together and chemical analysis was carried out. Five water samples, including a controlled potable (tap) water were analysed for pH, total dissolved solids (TDS), chloride, hardness, alkalinity, and sulfates. Chemical analysis results showed that although the chemical compositions of wastewater were much higher than those parameters found in tap water, the water composition was within the ASTM standard limits for all substance indicating that the wastewater produced can be used satisfactorily in concrete mixtures. M20 concrete mixtures were prepared using different proportions of wastewater and water-to-cement ratio of 0.45. The percentage of wastewater replaced 50% and 100% of tap water used in concrete. For each concrete mixture, nine 100mm x 100mm x 100mm cubes were used to determine the compressive strength at 28 days of curing. The compressive strength was also determined at 7 days of curing. Results indicated that the strength of concrete mixture prepared using wastewater was comparable to the control mixture.

A Major Project Report

On

Energy Analysis of G+1 Residential Building Using Autodesk Revit and Insight

Submitted to the
Department of Civil Engineering
School of Studies of Engineering and Technology
In partial fulfilment
Of the requirement for the award of the Degree of
Bachelor of Technology in Civil Engineering

Submitted by

SHEETAL

ERAM WARSI

GGV/21/01033

GGV/21/01042

Under the supervision of

Ms. PREETI SINGH

Assistant Professor

(Civil Engineering)



**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)**

(A Central University)

Session 2024-2025



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G)

A central University established by the Central University Act 2009 no 25 of 2009

CERTIFICATE

Certified that the major project report entitled "**Energy Analysis of G+1 Residential Building Using Autodesk Revit and Insight**", B. Tech VIII Semester, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering and Technology, Guru Ghasidas Vishwavidyalaya Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature.....

Ms. Preeti Singh
(Guide)

Signature.....

External Examiners

Signature.....

Prof. M. Chakradhara Rao
Head of Department
Department of Civil Engineering
Guru Ghasidas Vishwavidyalaya (A Central University)
Bilaspur (C.G)

ABSTRACT

The increasing demand for sustainable construction practices has intensified the need for accurate energy analysis during the building design process. This project focuses on the energy analysis of a G+1 residential building using Building Information Modeling (BIM) techniques through Autodesk Revit and Autodesk Insight. The objective was to assess and optimize the building's energy performance by simulating various design parameters and operational conditions.

A comprehensive 3D model was developed in Revit, incorporating accurate material properties, thermal characteristics, and HVAC systems. Energy simulations were conducted through Insight to evaluate factors influencing energy performance, including building orientation, window-to-wall ratios, window shading, glazing types, wall and roof insulation, lighting and HVAC efficiency. The initial energy analysis revealed an Energy Use Intensity (EUI) of 128 kWh/m²/year. Through iterative design optimizations, such as enhancing envelope insulation and adjusting operational parameters, the EUI was successfully reduced to 72.8 kWh/m²/year, along with a corresponding decrease in projected energy costs.

The study highlights the critical role of BIM-integrated energy modeling in facilitating data-driven design decisions to improve building energy efficiency and sustainability. It demonstrates the effectiveness of Autodesk Revit and Insight in enabling early-stage energy analysis, leading to more environmentally responsible and cost-effective residential construction. The findings also emphasize the importance of integrating such digital tools into engineering education to prepare future professionals for sustainable design challenges.

A Major Project Report on
WATER QUALITY INDEX(WQI) ASSESSMENT IN
GGV COMPUS USING QGIS

*submitted in partial fulfilment of the requirements of the award of the
degree*

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

Submitted by

BRAHMA SHANKAR PANDEY (21024143)

HEMA (21024110)

UNDER GUIDANCE OF

DR. BIJOLI MONDAL

Associate Professor
Department of Civil Engineering



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University established by the Central University Act No. 25 of 2009)

2021-2025



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the project report entitled **“WATER QUALITY INDEX
ASSISMENT IN GGV CAMPUS USING QGIS”** submitted by **HEMA &
BRAHMA SHANKAR PANDEY** in partial fulfillment of the requirements of
the award of degree of Bachelor of Technology in Civil Engineering, School of
Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya
Bilaspur is accorded to the student's work, carried out by him in the Department
of Civil Engineering during session 2024-2025 under my supervision and
guidance.

Sign... *Bijoli Mondal*...

Dr. Bijoli Mondal

Sign... *Suresh*...

EXAMINER(S)

Prof. M. Chakradhar Rao

Prof. M. CHAKRADHAR RAO
Head of Department
Civil Engineering Department,
School of Studies in Engineering and Technology
Guru Ghasidas Vishwavidyalaya

ABSTRACT

This study aims to assess the potable water quality within the Guru Ghasidas Vishwavidyalaya (GGU) campus using the Water Quality Index (WQI) method based on weighted arithmetic. Water samples were collected from two different locations and analysed for key physio-chemical parameters including pH, Total Dissolved Solids (TDS), Nitrate (NO_3^-), and Chloride (Cl^-), which are critical indicators of water quality as per BIS and WHO standards. Among the measured values, TDS and chloride concentrations recorded relatively higher readings, while parameters like fluoride and nitrate remained within minimal limits, indicating localized variation in groundwater chemistry.

The WQI values were calculated to be 16.67 for the first assessment and 25.55 for the second, placing both within the 'Excellent' water quality category, though the second sample was near the upper threshold of this range. These findings suggest that while water across the campus is safe for drinking, slight differences in parameter concentrations highlight the need for periodic monitoring. The study provides a concise yet comprehensive insight into the groundwater status and emphasizes the importance of multi-parameter-based assessment for ensuring sustainable water quality management.

MODELLING, ANALYSIS AND DESIGN OF RCC MOMENT RESISTING FRAMED BUILDING FOR GRAVITY LOADS USING ETABS

A Major Project Report

*Submitted in Partial Fulfillment of Academic Requirement for the Award of
Degree*

of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

Submitted by

ANIKET RANJAN

Roll-21024104

PREM RANJAN SINGH

Roll-21024123

RAHUL SINGH

Roll-21024125

B. Tech, VIII Semester

Under the Guidance of

Dr. VVS SURYA KUMAR DADI

Associate Professor



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)

Session 2024-2025

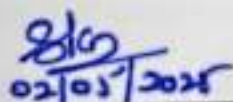


DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)

CERTIFICATE

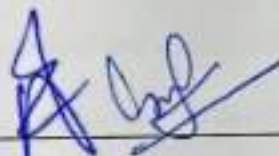
Certified that the project report entitled “MODELLING, ANALYSIS AND DESIGN OF RCC MOMENT RESISTING FRAMED BUILDING FOR GRAVITY LOADS USING ETABS” submitted by ANIKET RANJAN, PREM RANJAN SINGH & RAHUL SINGH in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, Department of Civil Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, is accorded to the students' own work, carried out by them in the Department of Civil Engineering during session 2024-2025 under my supervision and guidance.

Signature: _____


02/05/2025

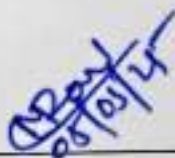
Dr. V V S Surya Kumar Dadi
Associate Professor
(Guide)

Signature: _____



Examiner(s)

Signature: _____


05/05/24

Dr. M. Chakradhara Rao
Professor & Head of Department
Department of Civil Engineering
School of Studies of Engineering and Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur.

ABSTRACT

Structural Analysis is a branch which involves in the determination of behavior of structures in order to predict the responses of different structural components due to the effect of loads. Each and every structure will be subjected to either one or the groups of loads, the various kinds of loads normally considered are dead load & live load. IS875 :1987 (Part 1, 2, 3) & earthquake loads (IS:1893-2016).

ETABS (Extended Three Dimension Analysis of Building System) is a software which is incorporated with all the major analysis engines that are static, dynamic, linear and non- linear, etc. This computer software's are also being used for the calculation of forces, bending moment, shear force, stress, strain deformation or deflection for a complex structural system. This software is useful for the analysis and design of the buildings.

In this major project, modelling, analysis and design of a RCC moment resisting framed of a G+4 storeyed building has been taken up for gravity loads using ETABS. The Dead load, and Live load are considered for the design of the building.

The modeling of G+4 R.C.C framed building along with analysis, design and detailing have been done using the ETABS software. The various design parameters and detailing specifications have been further checked using the manual calculation checks using the excel sheets for different frame members and slab sections. The project is designed as per Indian codes IS 875 Part 1, 2, 3 and IS 456: 2000.

The results have been further compared thoroughly by keeping all design parameters in the specified limits of Indian Standard Codes. The Details of reinforcement has been provided for typical columns and beams. The comparison of manual (Excel) and software (ETABS) design results are in close proximity without much error.

A Major Project Report
on

**PERFORMANCE EVALUATION OF M30 CONCRETE
REINFORCED WITH HYBRIDIZED STEEL & GLASS FIBRES**

Submitted in partial fulfilment of the requirements
for the award of Degree of
Bachelor of Technology in Civil Engineering.

Submitted by

Aniket Kumar Singh
(Roll no : 21024103)
(Enroll no : GGV/21/01003)

Pemendra Sahu
(Roll no-21024121)
(Enroll no.-GGV/21/01021)

Sushant Kumar
(Roll No : 21024139)
(Enroll no : GGV/21/01039)

Under the Guidance of
Dr. R.K. Choubey
(Professor)
Department of Civil Engineering
Guru Ghasidas Vishwavidyalaya



Accredited by NAAC with A++ Grade
DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES, ENGG. & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
A CENTRAL UNIVERSITY
(Established by the Central University Act 2009 No 25 of 2009)

SESSION : 2024-25



DEPARTMENT OF CIVIL ENGINEERING
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

CERTIFICATE

Certified that the major project entitled **"PERFORMANCE EVALUATION OF M30 CONCRETE REINFORCED WITH HYBRIDIZED STEEL & GLASS FIBRE"** submitted by Mr Aniket Kumar Singh, Mr. Pemendra Sahu & Mr. Sushant Kumar in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (CG) is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my guidance.

Signature
(Supervisor) Prof. R.K. Choubey

Signature
(External Examiner 1)

Signature
(External Examiner 2)

Signature.....

Prof. M. C. RAO

HOD

Department of Civil Engineering
School of Studies in Engineering & Technology, G.G.V

ABSTRACT

The present work has investigated the mechanical performance of hybrid fiber-reinforced concrete (HFRC) incorporating a combination of steel and glass fibers. A cumulative hybrid fiber dosage of 1.65% by weight of cement was made in three different combinations of steel and glass fibers to evaluate the synergistic effect of hybridization for the improved performance of M30 grade concrete. The base mix was designed for M30 grade concrete, and three sets of fiber-reinforced mixes were prepared: with varying proportions of steel and glass fibers. The compressive strength, split tensile strength, and flexural strength of the concrete specimens were observed for the curing period of 7, 14, and 28 days.

The outcome demonstrated that the hybridization of steel and glass fibers significantly improved the mechanical properties of concrete compared to plain concrete and concrete with solo fiber separately. The study concludes that the optimized hybrid mix offers enhanced strength characteristics due to the combined performances of hybridization. Steel fibre's contribution to ductility and post-crack resistance, while glass fibre performance in improved crack arresting capacity & tensile strength property may be attributed for the overall improvement in the mechanical properties of M30 grade concrete with Hybrid fibre dosage as above.

“ PLANNING, ANALYSIS AND DESIGNING OF AN INTEGRATED WATER SUPPLY SYSTEM OF GGV ”

Major Project Report

**Submitted in the partial fulfilment for the award of degree of
Bachelor of Technology in Civil Engineering**

by

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B. Tech VIIIth Semester

Under the Guidance of

Prof. SHAILENDRA KUMAR



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

**(A Central University established by the Central Universities Act No. 25 of
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CERTIFICATE

Certified that the major project entitled "**PLANNING, ANALYSIS AND DESIGNING OF AN INTEGRATED WATER SUPPLY SYSTEM OF GGV**" submitted by **PIYUSH SINGH GOUR, SANSKAR KUMAR and SAUGAT SINGH** in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering & Technology, Guru Ghasidas Vishwavidyalaya Bilaspur, is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature _____

Prof. SHAILENDRA KUMAR

Professor

Project Supervisor

Signature _____

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ABSTRACT

The increasing water demand within Guru Ghasidas Vishwavidyalaya (GGV) has unveiled critical limitations in the current water supply infrastructure, which is insufficient to meet the diverse needs of the academic, residential, and administrative zones of the campus. This major project seeks to address these challenges by designing an integrated water distribution system capable of ensuring a reliable, equitable, and sustainable water supply for the entire university.

A 20-year horizon is considered for forecasting future water demand, utilizing advanced population forecasting methods such as Arithmetic Increase, Geometric Increase, Incremental Increase, and the Logistic Curve approach. The analysis identifies the urgent need for additional infrastructure to support the projected population growth, estimated to be 27,105. Based on these findings, the project proposes the construction of reinforced cement concrete (RCC) overhead water tanks, strategically located within each zone to accommodate specific water requirements effectively.

The design of the overhead water tanks is initiated using AutoCAD, a widely utilized drafting software that facilitates precise layouts and designs tailored to the university's unique requirements. This is followed by a structural analysis conducted with STAAD PRO, a premier software for structural engineering. STAAD PRO ensures the tank's structural integrity and its capability to withstand various loads and environmental stresses, including wind, seismic forces, and operational pressures.

Additionally, the hydraulic analysis of the water distribution network is carried out using EPANET software, which enables accurate simulation and evaluation of flow rates, pressure distribution, and velocities across the pipeline network. The optimized design minimizes head loss, enhances operational efficiency, and ensures that the pipeline layouts can accommodate both current and future demands.

By addressing the inadequacies of the existing system and proposing robust engineering solutions, this project aims to modernize GGV's water distribution infrastructure, transforming it into a reliable and future-proof system. The implementation of this project is expected to significantly improve daily operations, alleviate water scarcity issues, and contribute to the sustainable development of the campus. Furthermore, the methodologies and findings presented herein serve as a valuable reference for similar infrastructure projects.