

**CERTIFICATE**

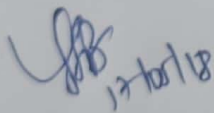
Certified that this project report on


**“ANALYSIS AND DESIGN OF DOVETAIL JOINT IN INTERLOCKING CONCRETE BLOCKS”**

Is the bonafide work of

<b>SONALI BHOJANE</b>	<b>(111401010)</b>
<b>HARSHAL CHAUDHARI</b>	<b>(111401015)</b>
<b>KARTIKEY CHAUDHARI</b>	<b>(111401016)</b>
<b>SAYALI DHINGE</b>	<b>(111401019)</b>

Who carried out the project work under my supervision.

  
**Dr S.S. BHOSALE**  
**HEAD OF DEPARTMENT**  
Civil Engineering Department,  
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**Dr I.P. SONAR**  
**PROJECT GUIDE**  
Associate Professor  
College of Engineering, Pune.

**DATE: 14<sup>th</sup> May, 2018**

**Place: Pune.**

## ABSTRACT

In present construction scenario, concrete blocks are well accepted units to build foundations, walls, arches and corbels. Concrete blocks have various types like solid, hollow, pavers, tree-guard blocks and they have wide range of applications like in load bearing structures, in framed structures, as ground laying units, etc. There is another concept of interlocking blocks. Interlocking blocks are like two adjoining pieces of jigsaw puzzle. Each block has a projection at one end and a depression at the other. For this the joint has to be strong.

A dovetail joint is a joinery technique most commonly used in woodworking joinery. It is noted for its resistance to being pulled apart i.e. tensile strength. This joint is very strong because of the way tails and pins are shaped. This makes it difficult to pull the joint apart. This emphasizes to use this joint where the members are in tension like retaining walls where the use of precast concrete blocks can be advantageous.

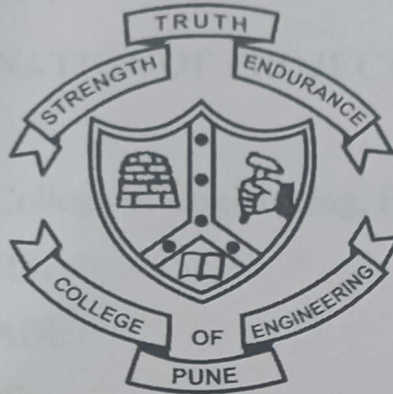
The objectives of this project are to design a concrete block having dovetail joint, to analyze that joint particularly in tension, to provide a strong interlocking joint and to increase the extent of application in areas like sloping to earthen dams, pavements, masonry walls and structural members. The project work includes following activities:

1. Deciding geometry of concrete blocks and dovetail joint.
2. Moulding and Casting of blocks.
3. Check for strength by conducting various tests.
4. Observing the modes of failure and improving the joint further from the observations of the tests.

# CERTIFICATE

College of Engineering, Pune

(An Autonomous Institute of Government of Maharashtra)



This is to certify that the project entitled

**“ASSESSMENT OF FEASIBILITY OF BAMBOO AS A  
GEOTEXTILE IN SOIL”**

Submitted by

**PARESH KAKADE (111401022)**

**NIKHIL KHADE (111401025)**

**RAMESHWAR METAGE (111401031)**

**TEJESHKUMAR SAWARKAR (111401057)**

is record of bonafide work carried out by them, under my guidance, in fully fulfilment of the requirement for award of degree of **Bachelor of Technology in Civil Engineering** as prescribed by **College of Engineering, Pune** for the year 2017-2018.

**Dr. Prof. I. P. SONAR**

Project Guide

**Dr. Sukhanand S. Bhosale**  
Professor & Head  
Department of Civil Engineering  
College of Engineering, Pune  
(An Autonomous Institute of Govt. of Maharashtra)  
**Dr. Prof. S. S. BHOSLE**

Head of Department

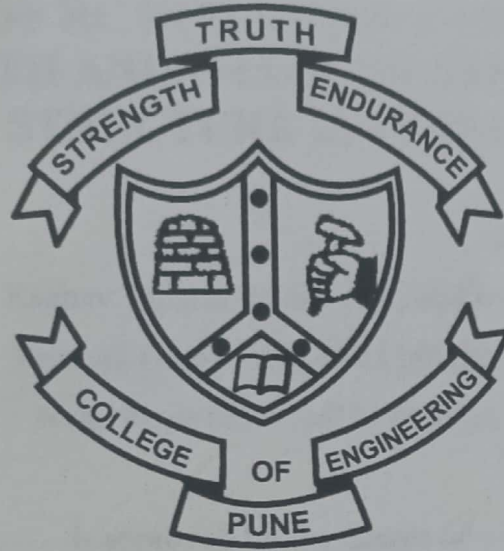
## ABSTRACT

GEOTEXTILES, a newly engineering field in civil engineering has a great potential in varied applications globally. Geotextiles play a significant role in modern pavement design and maintenance techniques. The growth of this field in transportation applications is phenomenal and it continues to grow further even in other sectors. Geotextiles functions in separation, filtration, drainage, reinforcement, sealing, protection. There are several differences between bamboo and wood. In bamboo, there are no rays or knots, which give bamboo a far more evenly distributed stress throughout its length. Some of the problems faced by the people in India are the bad quality of roads, cracked roads, water-logging issues during seasonal rains, innumerable potholes that are being generated every year, landslides in the Ghat regions that leads not only catastrophe but ultimate stoppage.

The purpose of this project was to test soil, to test bamboo and to test soil reinforced with bamboo in the form of half-splinted unlinked bamboo, single cross-linked bamboo, double cross-linked bamboo and ultimately bamboo mesh. It also includes analysis of the test results and to determine coefficient of friction in longitudinal direction and effect of lateral half splinted bamboo used as cross members. The project also includes testing of bamboo specimen reinforced in the soil to find its pull out resistance. Bamboo has a very significant property including its compressive strength, modulus of Elasticity and Rupture, etc. Besides this, Bamboo is cheaply available, and it is very economical from repairing and maintenance point of view. Bamboo as in geotextiles can be proven very advantageous in increasing durability, sustainability of Roads. Bamboo can be used in the form of fibers, meshes of half-splinted bamboo, meshes of Quarter-splinted bamboo and even with some complex structured Bamboo reinforcement.

The project though restricts its scope to find coefficient of friction, but the tests and their results can be used to find its application for slope-stability analysis, to compute number of bamboo required at any height, to test the same setup with different types of soil and with moisture contents and to try variety of configurations for bamboo. Even quarter splinted bamboo can be tried instead of half splinted bamboo. Hence, bamboo can be proven as one of most economical and strong material for Geotextiles. It can be seen from our experiment that how this cheap material proves strong from tensile strength considerations and effectively used as a geotextile.

# CERTIFICATE



This is to certify that the report entitled 'Analysis of RC Buildings under Seismic Excitation with and without consideration of Soil Structure Interaction' submitted by Authors Raghav Taparia (MIS No. 111401042), Vrushali Garde (MIS No. 111401063), Neha Pagar (MIS No. 111405036) in the partial fulfilment of the requirement for the award of degree of Bachelor of Technology (Civil Engineering) of College of Engineering Pune, affiliated to the Savitribai Phule Pune University, is a record of their own work.

**Dr. S. N. Madhekar**

**Guide**

**Civil Engineering Department  
College of Engineering Pune**

**Dr. S. S. Bhosale**

**Head of the Department**

**Civil Engineering Department  
College of Engineering Pune**

Date: 14/05/2018

Place: College of Engineering Pune

## ABSTRACT

Due to seismic forces generated during an earthquake, the structural elements and the soil in contact interact with each other. This interaction is known as Soil Structure Interaction (SSI). There are several cases of severe damages in structures due to SSI in the past earthquakes. This paper focuses on the study of SSI effects on high-rise RC buildings due to earthquake excitations. Analysis is carried out using Response Spectrum Method and Time History Method, considering three real earthquake ground motions on ETABS software. The structural response of multi-storey RC buildings, containing shear walls and having a fixed base on non-liquefiable soil, has been investigated under seismic forces. The same structure is then analysed with the consideration of SSI. Factors varied for the study are the building height (G+10, G+20), soil types (hard rock, medium stiff soil, soft soil), located in seismic zones II, III, IV, V of India. The results are obtained for these different cases, considering the maximum top storey displacement, storey drift and base shear. It is found that Soil Structure Interaction leads to an increase in the lateral displacements. This can increase the ductility demands. However, the base shear is found to reduce with the consideration of SSI.

**Keywords:** *Soil Structure Interaction, Earthquake, ETABS 2015, Base Shear, Storey Displacement, Storey Drift*

# ENVIRONMENTAL CLEARANCE FOR HIGH RISE BUILDINGS

Submitted in partial fulfillment of the requirements of the degree of Bachelor of Technology

by

Prajakta Tanpure (111401039)

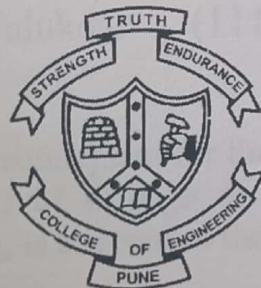
Darshan Rathi (111401044)

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Kanan Talukdar (111401056)

Guided by:

Dr. M. U. Khobragade



DEPARTMENT OF CIVIL ENGINEERING  
COLLEGE OF ENGINEERING PUNE  
(An Autonomous Institute of Government of Maharashtra)

2017-2018

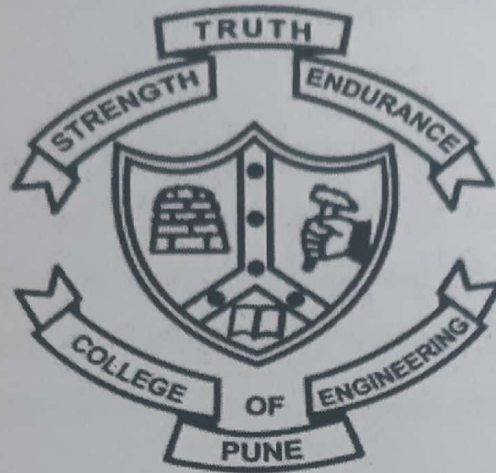
## ABSTRACT

Rapid Industrialization and population explosion in India has led to the migration of people from villages to city which increases human settlement in India's growing cities and town. This generates several issues with regards to environment. Environmental Impact Assessment (EIA) is becoming a very important study before commissioning of any project, plan or development in our country. EIA and Environmental Clearance (EC) are two things which the Government of India has mandated for all categories of project before their commissioning. Undertaking EC for construction industry and improving site management can reduce environment impacts both on and off site.

The EC study will be undertaken with an aim to prepare a detailed account of the environment impact of the proposed activity so that appropriate interventions could be taken. An attempt will be made in this project to study EC of high rise building construction project using checklist analysis methodology. The study will focus on various parameters such as total area, parking area, rain-water harvesting system, basement area, sewage treatment, water management, nearest sensitive zones and other factors.



# CERTIFICATE



This is to certify that report entitled, “**Porous Concrete Pavement : Study, Application and Construction Management Aspects**” submitted by **Rashmi Singh (111401043)**, **Nisha Rathod (111401045)**, **Salah Ajmal Khan (111401048)** and **Prashant Sukumaran (111401069)**. The work carried by them under my supervision in the partial fulfilment of the requirement for the award of the degree of **Bachelor of Technology (Civil Engineering)** of College of Engineering Pune, affiliated to the Savitribai Phule Pune University, is a record of their own work.

**Dr. M.S. Randive**  
**Guide and Associate Professor**  
**Department of Civil Engineering**  
**College of Engineering Pune**

**Head of Department**  
**Department of Civil Engineering**  
**College of Engineering Pune**  
**Pune 411005**

Date: 15<sup>th</sup> May 2018

Place: COEP, Pune

# ABSTRACT

In the last few years, the use of pervious concrete as a pavement material in low-volume road applications has gained importance due to its positive environmental aspects. This paper reviews the developments and state-of-the-art pertinent to pervious concrete research and practices. The investigations on pervious concrete performed in various studies have been reviewed. The storm water purification efficiency of pervious concrete has been documented. The field investigations of few test sections and in-service pervious concrete pavements have been discussed. A note has been mentioned on the life cycle cost analysis of pervious concrete. Due to an increased use of pervious concrete in the pavement industry due to its multitudinous benefits, there exists an expansive scope for further research to understand the material better, which will make it a promising sustainable roadway material in future.

Pervious concrete is one of the most effective pavement materials to address a number of important environmental issues, such as recharging groundwater and reducing storm water runoff. In this report, the findings of an experimental investigation on properties of pervious concrete are reported and discussed. The amount of general purpose Portland cement has been reduced by introducing fly ash as a cementitious agent in pervious concrete samples. The properties of various pervious concrete samples including density, porosity, compressive strength and water permeability have been carefully measured. environmentally friendly pervious concrete with fly ash can be produced in lieu of conventional pervious concrete. The pervious concrete can mainly have applied to Parking areas, Sidewalks & pathways, Residential roads, alleys and driveways, Shoulders & Medians, Under Overpasses & Bridges, Swimming pool decks, Slope stabilization, footpaths. Using selected aggregates, fine mineral admixtures, organic intensifiers and by adjusting the concrete mix proportion, strength and abrasion resistance can improve the pervious concrete greatly. While pervious concrete can be used for a surprising number of applications, its primary use is in pavement. This site focuses on the pavement applications of the material, which also has been referred to as porous concrete, permeable concrete, no-fines concrete, gap-graded concrete, and enhanced-porosity concrete. In general, the use of massive flexible and rigid pavement for road construction causing green land reduction that have an impact on the reduction of the catchment area. Therefore, the use of porous concrete is an environmentally friendly alternative. Its usage is expected to absorb water into the ground. Permeable pavements have different design goals if compared to the conventional pavement, due to the ability to infiltrate the storm water through the pavement surface. The purpose of this research is to get the optimum proportion of porous concrete mixture using a friendly environment binder material.

# CERTIFICATE

## DECLARATION



This is to certify that the project report entitled “**RISK INVOLVED IN INDUSTRIAL BUILDINGS**” is the work of **PRATIK AGRAWAL (111401072), VASISTH NARAYAN KANDARPA (111301034), PRATHAM SINGH (111401041) AND RIZA JAMAL (111301057)** who carried out the project under my supervision.

Dr. G. VYAS

Project Guide

Civil Department

College of Engineering, Pune

Date:

Place:

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Head of Department

Civil Department

College of Engineering, Pune

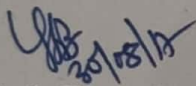
## ABSTRACT

This thesis is about risk management in Industrial building (IB) construction projects. The aim of the study is to identify the risks in the PUNE construction industry, understand how they are dealt with, and propose more effective frameworks for risk management in IB construction. A mixed method approach was used to fulfil the objectives of the study. For the questionnaire, google form link was shared with working professionals in the construction industry, including contractors, subcontractors, project managers and private consultants. Their responses were analysed using statistical techniques. Secondary data was also collected via literature reviews of print and website articles, and of books and documents from company, government and industry-specific databases. Knowledge about risk management is known, but more efforts need to be put to eradicate the problems associated with poorly managed IB construction projects. Using the suggestion of the respondents, python based frameworks were used for risk analysis. The study discusses the implications of risk management for practitioners and academicians in the construction industry. Poor risk management, which is usually the consequence of inadequate recognition of and/or responsiveness to risks and uncertainties, can have a devastating impact upon projects. It is hoped that practitioners applying the findings and suggestions in this study will see positive change, improved profitability and greater competitive advantage as a result.

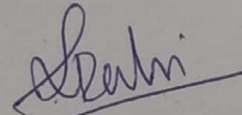
## CERTIFICATE



This is to certify that dissertation report on the topic “**Influence of Steel Slag Addition on Strength Characteristics of Clayey Soil**” submitted by **Mr. Anurag Hirapure** (MIS No. **121521009**) is record of bonafide work carried out by him under my supervision and guidance in partial fulfilment of the requirement for the award of the degree of Master of Technology in Civil Engineering with specialization in Geotechnical Engineering of College of Engineering, Pune.

  
28/08/17

**Dr. S. S. Bhosale**



**Dr. (Mrs.) R. S. Dalvi**

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**Place:** Pune

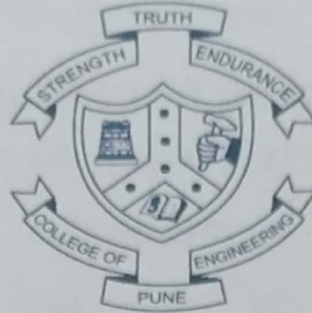
**Date:** 28/08/2017

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**Abstract**

The disposal of industrial waste or by-products has become more difficult and expensive as a result of the increasing environmental regulations and shortages of suitable disposal sites. Steel slag is a by-product of steel making and is produced during the separation of the molten steel from impurities in steel-making furnaces. Steel slag has long been used in various applications in the construction industry such as aggregates in road construction, railway ballast and hydraulic protection structures. The use of steel slag in the soil stabilization is modern approach. The main focus of this research is to study the effect of steel slag on strength characteristics of the clayey soil. The steel slag is blended with clayey soil as 10 %, 15 %, 20 %, 25 % and 30 % of dry weight. The optimum content of steel slag is found, based on the maximum unconfined compressive strength. Further series of laboratory test has been performed on the optimum mix to evaluate its suitability of stabilizer material. The test were also conducted with conventional stabilizing material with clayey soil and the obtained optimum mix and results were compared accordingly. Furthermore, Pavement Section has been modelled using finite element analysis in plaxis software to know the behaviour to mix under static and dynamic loading. From the above study it has been seen that the addition of steel slag shows significant improvement in strength parameters and other geotechnical properties which reflects to its suitability as a stabilizer for clayey soil.

# CERTIFICATE



This is to certify that the report entitled 'Traffic Noise Management: Assessment, Analysis And Design of Noise Barriers' submitted by Aditi Amit (111401001), Greeshma Angane (111401004), Tushar Patil (141501012) and Suyog Gadakh (141501004) in the partial fulfilment of requirement for the award of degree of Bachelor of Technology (Civil Engineering) of College of Engineering Pune, affiliated to Savitribai Phule Pune University, is a record of their own work.

**Dr. M. U. Khobragade**

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**Dr. Sukhanand S. Bhosale**  
Professor & Head  
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Shivajinagar, Pune - 411 005

**Dr. S.S. Bhosale**

**Head of Department**

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College of Engineering, Pune.

Date: 19<sup>th</sup> May 2018

Place: COEP

## ABSTRACT

Noise is unwanted sound. When noise exceeds the permissible level, it causes various problems for the listeners. Therefore, in the design of any construction, this has to be taken into consideration, especially in case of public utility services. **Sound** is the sensation caused in the ear by the vibration of the surrounding air or other medium. But on the other hand when the sound is not pleasing, it becomes unwanted and turns into noise. Acoustic and noise control plays a very important role in the design and construction of public utility service such as flyover, buildings etc. Main purpose of our project is to study and design a sound barrier for a H. K. Firodiya flyover passing through the area of College of Engineering Pune so that impact on the recipients is reduced. Since noise propagates spherically in all directions, it is necessary to consider advanced analysis methods that can handle the complexities of noise propagation.

To overcome the problem, noise level was measured on the H.K. Firodiya flyover at three junctions and in vicinity of CoEP campus. By comparing the measured readings with the permissible noise limits it was concluded there is need to design the noise barrier. The noise barrier was designed accordingly using the Soundplan software and its specifications (geometric parameters) were obtained. The results produced provided us with reduced noise levels propagating in and around COEP campus.