

## STRENGTH ASSESSMENT AND RESTORATION OF RC STRUCTURES BY NON-DESTRUCTIVE TEST TECHNIQUES

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### ABSTRACT

In effect, concrete is widely used as a construction material because of its high strength-cost ratio in many applications. Concrete constructions are generally expected to give trouble free service throughout its intended design life. However, these expectations are not realized in many constructions because of structural deficiency, material deterioration, unanticipated over loadings or physical damage and thus Civil structures like buildings, dams, bridges etc are subjected to continuous deterioration over the years. This extent of damage or deterioration greatly depends on the quality of materials and workmanship at each the construction stage. The deterioration of buildings can be a result of various factors including fire damage, frost action, chemical attack, corrosion of steel etc during the life span of the structure. The investigation of soundness is thus essential for finding the present serviceability of the structure and its scope for future developments or for the change in its utilization. Such an investigation can be carried out using the following methods: a) Visual examination b) Non-Destructive Testing. Besides, it becomes essential for buildings hit by an earthquake, a bomb blast or any other calamity. In general, Soundness estimation to be done for buildings which are crossed over 15 years of age.

### INTRODUCTION

Civil engineering infrastructure is one of the most expensive national investment and asset of any country and facilitates country's economic development. Structures are assemblies of load carrying members capable of safely transferring the loads to the foundations. To serve their designated purpose, the structures must satisfy strength and serviceability criteria throughout their stipulated design life. However, the strength of these old structures reduces in the due course of time because of its usage, input of poor-quality construction materials, environmental conditions, improper practice or poor workmanship. Also, several factors like natural disasters, construction flaws, interaction with environment develops distress in the structures which may results in development of cracks, corrosion in reinforcement, leakage and seepage.

After a large-scale earthquake, evaluation of damage of highway structures such as bridge structures has great importance to assure the emergency route for rescue and transport of urgent supplies. The damage evaluation is basically conducted by means of visual inspection by experts, but generally it takes so long time to collect whole damage information in the affected area.

Therefore, it is necessary to assess the strength of RC structure periodically using NDT Techniques (Rebound Hammer, Ultrasonic pulse velocity and carbonation test), which can detect the damage level of structures more correctly and quickly. RC Structure begins to deteriorate once they are built and used. Non-Destructive techniques can also be used for Structural Health Monitoring. Structural Health Monitoring (SHM) is the process of continuously monitoring a structure for degradation or damage. This system enables inspectors and engineers to gather material data and structural elements used for analysis.

### CAUSES FOR DAMAGE

- Ageing of Structure
- Natural Disaster like Earthquakes etc.
- Improper Design and Construction
- Environmental and Climatic Conditions
- Corrosion
- Fire

### OBJECTIVE OF THE STUDY

- The main objective of this project work regarding strengthening and restoration of an RC structure is:
- To identify the strength of the existing building using Non-Destructive tests.
- To assess the extent of carbonation in cover concrete.
- To provide the best available restoration measures to strengthen the damage structure.

### METHODS AND MATERIALS

The non-destructive testing of concrete has a great technical and useful importance. These techniques have been grown during recent years especially in the case of construction assessment. Non-Destructive evaluation methods are used to find damage. NDT methods inspect or measure without any harm to the structure, no damage of specimens is required during testing.

Several non-destructive evaluation methods have been developed based on that some physical properties of concrete can be related to the compressive strength of concrete. The rebound hammer (SRH) and the half-cell potential method measurements have proved to be an effective tool for inspection of concrete quality.

#### 1. Rebound Hammer Test

The rebound (Schmidt) hammer is one of the oldest and best-known methods. It is usually used in comparing the concrete in various parts of a structure and indirectly assessing concrete strength. The hammer

## LABOUR PRODUCTIVITY ANALYSIS REPORT

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### ABSTRACT

Poor productivity of construction workers is one of the causes of cost and time overruns in construction projects. As construction is a labour-intensive industry, this project focuses on labour productivity in the construction industry. It covers the construction, labour productivity definitions, and the factors affecting it. The main outcome from the literature is that there is no standard definition of productivity. This project provides guidelines for necessary steps required to improve labour productivity in the construction site. The productivity of labour is particularly important especially in developing countries, where most of the building construction work is still on manual basis. This project reports on a survey made on project managers and experienced engineers of building projects in Bharani constructions and Engineering projects. Where an increase in productivity is being poor. Respondents were required to rate using their experience how all factors affect productivity with respect to time, cost and quality. The survey was carried out by a questionnaire and responses. The most significant factors affecting labour productivity for Bharani construction are identified.

### INTRODUCTION

Construction is the world's largest and most challenging industry. Human resource today has a strategic role for productivity increase of any organization, and this makes it superior in the industrial competition. With the effective and optimum uses of it, all the advantages supplied by the productivity growth can be obtained. Construction is a key sector of the national economy for countries all around the world, as traditionally it took up a big portion in nation's total employment and its significant contribution to a nation's revenue as a whole. However, until today, construction industries are still facing number of problems regarding the low productivity, poor safety and insufficient quality. Productivity is the one of the most important factors that affect overall performance of any small or medium or large construction industry. There are number of factors that directly affects the productivity of labour; thus, it is important for any organization to study and identify those factors and take an appropriate action for improving the labour productivity. At the micro level, if we improved productivity, ultimately it reduces or decreases the unit cost of project and gives overall best performance of project. There are number of activities involved in the construction industry. Thus, the effective use and proper management regarding labour is very important in construction operations without which those activities may not be possible.

#### WHAT IS LABOUR PRODUCTIVITY?

Productivity can be defined in many ways. In construction, productivity is usually taken to mean labour productivity, that is, units of work placed or produced per man-hour. The inverse of labour productivity, manhours per unit (unit rate), is also commonly used. Productivity is the ratio of output to all or some of the resources used to produce that output. Output can be homogenous or heterogeneous. Resources comprise: labour, capital, energy, raw materials, etc.

##### A. **Productivity = Output / Man days worked**

Output- area executed by the labour (unit in Sqm)

Mandays- number of hours worked by the labour converted into days (8 hours per day)

"Productivity may then be defined as the ratio of earned to actual hours. The problem with this concept is in establishing reliable norms", for setting standards. It also depends on the method used to measure productivity, and on the extent to which account is taken of all the factors which affect it.

At the project site, contractors are often interested in labour productivity. It can be defined in one of the following ways –

##### **Labour Productivity = Output / Labour cost**

There is no standard definition of productivity and some contractors use the inverse of above, hour

##### B. **Labour Productivity = Labour cost / Output**

There are however, a number of different productivity measures that are commonly used. Choosing between them usually depends on the purpose of the productivity measurement and the availability of data.

Productivity measures can broadly be placed into two categories. Single factor, or partial, productivity measures relate a particular measure of output to a single measure of input, such as labour or capital. Multi – factor or total productivity measures (MFP) relate a particular measure of output to a group of inputs, or total inputs used. Productivity measures can also be distinguished by whether they rely on a particular measure of

## EXPERIMENTAL AND ANALYTICAL STUDY ON STUD TYPE SHEAR CONNECTOR IN COMPOSITE SECTION

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### ABSTRACT

Composite Structures have several advantages over traditional reinforced concrete which incorporate high strength to weight ratios, dimensional stability and structural integrity. Late years have seen a considerable increment in the utilization of composite structures and improved research went for creating new strategies for combining steel and concrete. Composite structures result in efficient design and economy in construction time hence used especially in construction of building floors and bridges. Wide construction practices involve connecting Concrete slab and hot rolled steel beam sections by shear connectors. Shear Connectors are used to enhance proper connection and resist horizontal shear forces. A Composite member has to be designed in such a way that before composite structural element reaches ultimate capacity, shear connectors should not fail due to lack of ductility. This work represents a concerning the prediction of the shear resistance of head stud connectors in composite beam with profiled I-steel sheeting subjected to static load. To confirm the FE simulation for the determination of the shear resistance of stud connectors many experimental push out test. The shear connector can be used at various distances. In our project, we discuss about the stud type shear connector can be placed at various distance and determine the strength and maximum deflection of beam by using shear connector at a required distance.

**Key words :** I Beam, Headed stud connector, Concrete slab, Beam element, Solid element, ANSYS, Push – out test.

### INTRODUCTION

#### 1.1 General

Composite steel–concrete construction, particularly for multi-storey steel frames. This is mainly due to a reduction in construction depth, to savings in steel weight and to rapid construction programmers. Composite action enhances structural efficiency by combining the structural elements to create a single composite section. Composite beam designs provide a significant economy through reduced material, more slender floor depths and faster construction. Moreover, this system is well recognized in terms of the stiffness and strength improvements that can be achieved when compared with Non-composite solutions.

#### 1.2 Composite construction

Composite construction consists of providing a monolithic action between prefabricated steel joists and cast- in situ concrete slabs. A sufficient shear connection is provided between the two component construction units so that the two units act as one unit and resist the load by composite action where most of the compression is taken by concrete and the tension by the joist.

#### 1.3 Shear Connector

The latest technology used in construction of buildings and bridges. They are used as a major element in the composite structure. Excellent quality, high load bearing capacity, durability, faster speed of construction, etc. are some of the reasons why it is gaining popularity in the construction industry.

"Shear connector means headed steel studs. These are welded to a structural member for achieving composite action with concrete. Shear connector is one of the major elements in the composite structure.

#### 1.4 Role of shear connector in composite structure

A Shear connector belongs to a steel projection to be applied on the top flange of steel composite bridge girders to transmit required shear among the steel girder and composite slab to facilitate composite action. The headed stud is mostly recognized form of shear connector, or shear stud. Other forms of shear connector range from block and hoop, and channel connectors. Block and hoop, and channel connectors are mainly applied for transmission of large shear. These are good substitute to narrowly spaced shear studs.

#### 1.5 Objectives of the study

- The present work on 'Analytical and Experimental Study on Stud Type Shear connector in Composite Structure' has the following objectives.
- To verify the influence of the dimension and height of shear connectors in composite beams.
- To find longitudinal slip in the slab-beam interface, the vertical displacement at mid-span and the bearing capacity of composite beams.
- To find load bearing capacity and resistance for failure by shearing, in composite structure.

### MATERIAL USED

The details of these materials are given below.

- Hot rolled steel beam section
- Concrete slab
- Headed shear connector

#### 2.1 Properties & Sizes of material

## **ANALYTICAL AND EXPERIMENTAL INVESTIGATION ON COLD FORMING STEEL BEAM WITH TRAPEZOIDALLY CORRUGATED SHEET AS WEB**

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### **ABSTRACT**

*This paper describes the experimental investigation on flexural behaviour of cold formed steel (CFS) lipped trapezoidal corrugated section. Cold-formed steel is getting popular over the years in construction industry. However, due to its thin-walled behaviour, cold-formed steel is prompt to have buckling failure, previous research were done to provide stiffener in order to overcome this problem. In this research paper three different sets of corrugated sections have been taken for testing flexural behaviour namely (i) horizontal corrugated back to back lipped trapezoidal sections without gap (ii) horizontal corrugated back to back lipped trapezoidal sections with gap and (iii) vertical corrugated lipped trapezoidal sections by providing corrugation angle in horizontal and vertical direction. Corrugated section of cold-formed steel behave differently in beam and column compared to straight section. Corrugated section has an advantage of exhibit distinct enhancement in ultimate strength and reduced deflection in flexural behaviour. Both the Experimental and Analytical study were carried out for the chosen specimens respectively. It was noticed from the Analytical results that there was an increase in Ultimate Load carrying capacity for the vertically corrugated section. For the selected corrugated sections, it was observed from the Experimental values that the ultimate load carrying capacity was increased by 9.7% in the vertically corrugated section. This would have been because of the provision of stiffeners at the edge and web of the section.*

**Keywords:** cold-formed steel, corrugation angle, flexural behavior

### **INTRODUCTION**

#### **1.1 GENERAL**

Cold-formed steel sections are developing at a rapid rate such that they are used as a common method of constructing light-weight floors and portal frame structures. In fact it can be said that cold-formed steel (CFS) construction is now one of the highly competitive alternative to traditional structural system. Some of the widely acknowledged advantages of CFS framings are: lighter weight, reduces transport and handling costs, ease of prefabrication and mass production. The optimal design of CFS system is important in ensuring that they can produce a cost-effective solution which is somewhat lagging in other types of structural systems. In steel construction, there are two main types of structural members one is hot rolled section and the other is cold-formed section. Cold formed sections like Channel, Zee sections, I-sections, angles, T-sections, hat sections, and tubular members are commonly used flexure members for purlins & girt in roof and wall system. These sections are extensively used in various engineering applications because of their high strength to weight ratio.

#### **1.2 COLD FORMED STEEL SECTION**

Cold-formed steel (CFS) section is the term used for products which are made by rolling or pressing thin gauges of steel sheets into goods. CFS goods are created by the working of thin steel sheets using stamping, rolling or presses to deform the steel sheets into a proper product which are usable.

##### **1) 1.3 ADVANTAGES OF COLD-FORMED STEEL MEMBERS**

1. Members are light in weight.
2. Sections have High strength and stiffness.
3. The erection and installation procedure is very easy.
4. The conventional connection methods like riveting, bolting or welding can be used.
5. The construction process does not need any kind of formwork.
6. The desired shape and desired length are obtained by prefabrication process.
7. The transportation cost is lower as the lightweight sections are available.
8. The recycling of this type of material is possible easily.
9. The termite-proof and rot proof sections are prefabricated.

As compared to the hot rolled section the greater moment carrying capacity is possible due to the thinner wall sections.

#### **1.4 Objectives of the study**

The present work on 'Analytical and Experimental Investigation on cold formed Steel beam with trapezoidally corrugated sheet as web' has the following objectives.

- To find load carrying capacity as compared with plane web beam.
- To find deformation of the section.
- To find failure in shear zone.
- To find lateral torsional buckling.

#### **MATERIAL USED**

- ISMB 150 section (I – Section)

## CHALLENGES FACED IN THE CONSTRUCTION INDUSTRY IN URBAN AREA

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### ABSTRACT

*This paper plans to recognize the different difficulties looked in the development in urban territories. The objectives of this research are mainly urban infrastructure development and its challenges and identifying various tasks involved in this project. Questionnaire survey is used to find out the difficulties involved in urban infrastructure and enhance the urban construction project. Questionnaire survey is collected from various industrial experts in their company from different regions of Tamilnadu. The questionnaire Survey were conducted at Erode, Salem and, Namakkal. The data collected from the administered questionnaire will be analysed using the cumulative percentage analysis. A total of fifty-four questionnaires were prepared and will be distributed to the companies. Based on the survey the ranking were given to the factors. Identifying most of the important criteria based on an appropriate tool to indicators rated on Likert- type scale. The overall rating were determined by placing the overall percentage score card within the numerical ranges. The research result can be useful as a guideline of engineers and contractors it increases the overall performance of projects.*

### 1. INTRODUCTION

This paper aimed to addressing various issues of urban construction. The important thing is population, and it creates the challenge for construction projects such as transportation, skilled labours shortage, material damage during work and safety equipment not used. Performing construction site delivers in cities in an important and interesting issues due to the impact of transport on the natural environment, road traffic organization and aspects of rationality in construction site delivers planning (5). Urban planning as branch of architecture with the design and organization of urban space and activates besides determining and drawing up plans for the future physical arrangement (4). This may include a synchronized and cost effective way of using the materials and resources in an order to minimize the hazards that may arise along with monitoring and cost controlling the unfortunate event that may occur (2). The characteristics of each project keeps on changing which make it difficult to be imitated. This requires unique skills to manage and accomplish the process. The objective of the investigation is to have a view of the challenge management process from the perspective of different participants of the project (8). From the basis of analysing them, required questionnaire was prepared appropriate to the research methodology. A survey was done, which ranged from clients, experts, consultants and contractors. Among these participants a few were chosen who had experience in challenge management projects in particular.

### 2. SCOPE OF THE STUDY

- This study can help to optimize cost and time in the construction industry.
- It can help to find the challenge in the construction industry in urban areas.
- This study resource utilisation in the construction industry.

### 3. OBJECTIVE OF THE STUDY

- To identify and evaluate various challenges in the construction industry in urban areas.
- To find the factors affecting challenges in urban area and avoid top critical factors in the challenge.
- To suggest ways to improve the performance of construction project.



## MECHANICAL PROPERTIES OF SELF COMPACTING CONCRETE BY UTILIZATION OF HYBRID FIBERS

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### Abstract

*Self compacting concrete is a non segregate concrete that is placed by means of its own weight. It is well flow able concrete that can spread without need of tremor. In this study steel and polypropylene fiber are used as hybrid fiber to develop the workability of the concrete. The addition of CONPLAST SP 430 is used as a chemical admixture which is added to SCC by the volume of 2% of cement. These components like hybrid fiber and super plasticizer are added to the concrete to build up the better strength and durability of self compacting concrete. In this study, the various mix proportions of fibers discussed in this study are 0%, 0.25%, 0.5%, 0.75%, 1%, 1.5% resolute by preliminary test on self compacted materials. By this preferred compositions test for fresh concrete such as slump flow, L-box and V-funnel, U box, J ring are performed for SCC. It is found that compression, split tensile strength, Flexural strength has been enhanced by the addition of hybrid fibers at 1% respectively. This investigational study is carried out to improve the compressive, split tensile strength and flexural strength in SCC for obtaining the optimum value.*

**Keywords** Hybrid fibers, self compacting concrete, steel fibers, polypropylene fibers.

### 1. INTRODUCTION

Self-compacting concrete is a flowing mixture appropriate for placing in structures with congested reinforcement without vibration. Self-compacting concrete growth must make sure a good balance between deformability and stability. For SCC, it is generally needed to use super plasticizers in order to attain high mobility. Addition of large volume of crushed material or viscosity modifying admixture can eliminate segregation. The materials such as fly ash, silica fume, limestone powder, glass filler and quartzite filler are also added.

SCC can also provide a better working atmosphere by eliminating the vibration noise. The concrete requires a high slump that can easily be achieved by super plasticizer addition to a concrete mixture. The concrete to remain cohesive during operations, special attention has to be paid to mix proportioning.

SCC is a fluid mix with the following unique practical features it flows very easily within and around the formwork, can flow through obstructions and around corners, is close to self-leveling does not need vibration or tamping after pouring, and follow the shape and surface texture of a mold very closely once set. As a result, pouring of self compacting concrete is also much less labor-intensive compared to standard concrete mixes. SCC does not make use of a high proportion of water to become fluid – in fact SCC may contain less water than standard concretes. Instead, SCC gains its fluid properties from an unusually high proportion of fine aggregate, such as sand, combined with super plasticizer and viscosity modifying agent (VMA).(3)

Self compatibility can be achieved by the following mechanism

- ✓ Limited aggregate content
- ✓ Low water –powder ratio
- 3. Use of super plasticizers

### 2. FIBER REINFORCED COMPACTING CONCRETE

- Fiber reinforced self-compacting concrete (FRSCC) contain only one type of fiber. The two fibres in a suitable combination may improve the overall properties of self-compacting concrete In this way, not only the effect of single fibre and the synergy effect of hybrid fibres, but also the size and concentration effect of fibres, which had different ratios in total fibre volume, were investigated.(1)
- The combination of two or more fibers, often called hybridization.
- The hybridization with two different fibers integrated in a common cement matrix, the hybrid composite can offer more attractive engineering properties.(2)

## **A PROFOUND STUDY ON FACTORS AFFECTING COST ESTIMATION IN CONSTRUCTION PROJECT**

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### **ABSTRACT**

*Cost estimating is an assessment of the expected cost of any construction project. The accuracy of such estimate has a serious effect on the expected profit of the construction contractor. Hence, a certain contingency premium should be added to the base estimate to increase the level of confidence. Such premium is materially affected by many factors. Through this research, the main factors that are expected to affect the accuracy of the building construction project's cost estimate were clearly identified. Fourteen factors are identified as the most important factors. These factors were: similar construction projects, construction material cost, labor wage rates, construction site conditions, inflation factor, project schedule, quality of plans & specifications, reputation of engineer, regulatory requirements, insurance requirements, size and type of construction project, location of construction, engineering review, and contingency. While doing project estimate of any project one has to considered be said factors with full attention for better outcome.*

### **INTRODUCTION**

Many factors affect the accuracy of building construction projects' cost estimating which should be considered in the early stage of the estimating process. Some factors can incorrectly increase the estimated costs and the possibility of contractual disputes between the various parties involved. Other factors can help the estimator to decrease the unnecessary cost of an item and hence lead to successful tendering in a very competitive market.

Therefore, accurate estimating requires detailed study of the bidding documents and the environmental situation. It also involves a careful analysis of all projects' data in order to arrive to the most accurate estimate of the probable cost consistent with the bidding time available and the accuracy and completeness of the information submitted.

Realistic estimation of construction cost is vital for both successful planning and completion of every construction project. Also in the face of uncertain conditions, reliable cost forecasts become an important source of information for decision making by all construction parties. Accurate cost estimation at the early stage of a construction project is key factor in a project's success. But it is difficult to quickly and accurately estimate construction costs at the planning stage, when drawings, documentation and the like are still incomplete. As such, various techniques have been applied to accurately estimate construction costs at an early stage, when project information is limited. While the various techniques have their pros and cons, there has been little effort made to determine the best technique in terms of cost estimating performance. The purpose of this paper is to explore the significant factors affecting the cost estimation of construction projects.

## STRENGTH AND DURABILITY OF HFRC AS A PARTIAL REPLACEMENT OF COARSE AGGREGATE BY COCONUT SHELL

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### ABSTRACT

The aim of this paper is to produce an eco-friendly concrete by replacement of agricultural waste- Coconut shell as a coarse aggregate and a replacement of Clay as Cement in HFRC. The hybrid fibers- steel fibers and coir fibers which is an additive material used in concrete. The experiment was conducted on reinforced concrete with addition of hybrid fibers with 10% of CS replaced for coarse aggregate and clay as cement and 0% to 2% of steel fibers and coir fibers to the volume of concrete. Here we use M-sand as fine aggregate. The compressive strength, split tensile strength, saturated water absorption and porosity of cured concrete is evaluated for at the age of 7 and 28 days. The study found that the maximum result is obtained at the replacement of steel fiber 1.5% and coir fiber 0.5% in 10% of clay and CS concrete.

### INTRODUCTION

The concrete is a most important construction material, which cost is directly proportional to the cost of cement <sup>[19]</sup>Concrete is a composite material which composed of aggregates, cement and water. Concrete is used more than any other manmade material in the world <sup>[20]</sup>. So finding the substitute of a cement, in concrete is very much field of interest now a days. <sup>[19]</sup> Among all the ingredients, aggregates form the major part. Use of natural aggregate in such a rate leads to a question about the preservation of natural aggregates sources <sup>[19]</sup>.

Consumption of alternative waste material in place of natural aggregate in concrete production not only protects environment but also makes concrete a sustainable and environment friendly construction material<sup>[3]</sup>. Since waste materials can be obtained at little or no cost, while making significant contribution to the conservation of natural resources and maintenance of ecological balance<sup>[2]</sup>

The high demand for concrete in the construction using normal weight aggregates such as gravel and granite drastically reduces the natural stone deposits and this has damaged the environment thereby causing ecological imbalance, there is a need to explore and to find out suitable replacement material to substitute the natural stone.<sup>[4]</sup>Use of agricultural waste in construction industry holds a high potential of reducing global environmental pollution.<sup>[10]</sup>

There are a number of agricultural wastes are used as a full or partial replacement of coarse aggregate<sup>[8]</sup>Some of the agro-wastes like date seed, rubber seed, coconut shell, oil palm shell, corn cob, cockle shell, and periwinkle shell. Out of that stated materials coconut shell is an light weight aggregate<sup>[13]</sup> and locally available materials and also good performance in structural members which compared to conventional<sup>[9]</sup> In developing countries, where abundant coconut shell waste is discharged, these wastes can be used as potential material or replacement material in the construction industry. This will have the double



## STABILIZATION OF RED SOIL USING BLAST FURNACE SLAG

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### ABSTRACT

Now a days, a large acres of land is occupied by industrial waste. It not only creates land problem but also creates environmental problems. In order to utilize the industrial waste, an attempt is made to stabilize the red soil by adding blast furnace slag.

This project work aims to evaluate the effect of addition of 0%, 5%, 10%, 15%, 20% blast furnace slag in order to stabilize the red soil and to verify its suitability to be used as a construction material for road, embankment and structural fills. The blast furnace slag is collected from Pallipalayam, Erode and the red soil is collected from the campus of K.S.R College Of Engineering for evaluating its suitability as a construction material for various geotechnical works. Its consistency properties, compaction properties, and strength parameter are tested. In this project the effects of addition of blast furnace slag is investigated and is compared with that of the virgin red soil. The overall testing program was conducted in two phases. In the first phase, the physical, and chemical engineering properties of the red soil samples were studied by conducting UCS test. In the second phase of the test program, red soil was mixed with 0%, 5%, 10%, 15%, and 20% of blast furnace slag as percentage of dry weight of red soil. The particular UCS samples were cured for 3, 7, 15 days with varying ambient temperature. Based on the analyses of experimental results the Plasticity Index is decreasing up to a value of 27.6% with addition of 20% of blast furnace slag with red soil. The UCS value is maximum with addition of 10% of blast furnace slag afterwards the UCS value decreases with further addition in blast furnace slag.

### INTRODUCTION

Stabilization of soil in a broader sense is the modification of the properties of a soil is improving its engineering performance. Soil stabilization is broadly used in connection with road, pavement and foundation construction. It improves the engineering properties of the soil in terms of volume stability, strength, and durability. Soil stabilization occurs over a longer time period of curing. The effects of blast furnace slag stabilization are usually measured after 0days, 3days, 7days, 15days or longer. A soil that is treated with blast furnace slag is modified and its properties are changed which may lead to stabilization. When sufficient amount of blast furnace slag is added to the soil, stabilization occurs. Stabilization is different than modification as strength increases. Over a long time period, the strength increases up to the addition of 10% of blast furnace slag. Red soil is generally, is derived from weathering of ancient metamorphic rocks of the ancient Deccan plateau. It is red colour due to the abundance of iron in it. When iron content is suitably lower, the colour will be yellow or brown colour. Red soil is usually that group of soil that develops in warm temperature and is generally abundant in moist climate where deciduous or mixed forests are present. They generally have a thin organic and inorganic mineral layer overlaying a yellowish brown layer resting on the alluvial deposits. Red soil is available in many states of India. Red soil is generally found in Odisha, Tamil Nadu, Karnataka, Maharashtra, Chhattisgarh, Birnbaum (West Bengal), Mirzapur, Jhansi, Haripur (Uttar Pradesh), Udaipur, Durgapur, Batswana and Bhilwara districts (Rajasthan), Chotanagpur plateau of Jharkhand, AndhraPradesh.

Blast furnace slag is use to make iron operate on temperatures capable of 2000°C and are feed with a carefully to inhibited mixture of limestone, iron ore, and coke. The iron ore transfer to iron which sink to the base of the furnace. Blast furnace slag is a by-product material generate by thermal power plants from combustion of iron, iron ore, iron scrap, and fluxes (limestone or dolomite) are charged into a blast furnace along with coke for fuel. The coke is combusted to produce carbon monoxide, which reduces the iron ore to

## EXPERIMENTAL BEHAVIOUR OF STEEL FIBER REINFORCED CONCRETE WITH PARTIAL REPLACEMENT OF FLY ASH & METAKAOLIN

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### ABSTRACT

Concrete is largely used due to the abundance of raw material, low manufacturing and maintenance cost, excellence in compression, corrosion aspects, and versatility in forming various shapes and its unlimited structural applications in combination with steel reinforcement. All these factors have contributed pressures to reduce cement consumption and to intensify research in exploring the possibilities of enhancing strength, durability and corrosion reduction through the use of pozzolonas as supplementary cementing materials. Fibre reinforced concrete (FRC) is a fibre reinforcing cementitious concrete composite, and by adding discrete short fibres randomly in concrete it exhibits many substantially improved engineering properties. It is manufactured from kaolin which makes the concrete more durable and ecofriendly. In the present investigation mechanical properties of concrete containing both Fly ash and Metakaolin at various combinations are studied. For the various combinations of Fly ash and Metakaolin, cubes cylindrical and prism specimens are casted with 1% of fibres and the compression strength, split tensile strength and flexural strength test results are obtained and compared with the conventional mix having 1% fibres. It is thereby suggested that utilization of these cementitious materials in concrete will reduce the requirement for cement thereby marching towards green construction.

**KEYWORDS:** FRC, flyash, metakaolin, pozzolonas

### 1. INTRODUCTION

Concrete is the most widely used man made construction material in the world, and is the second next to water as the most utilized substance on the planet. It is obtained by mixing cementitious materials, water, aggregates and admixtures (if needed), in required proportions. The mixture when placed in forms and allowed to cure hardens into a rock-like mass known as concrete. Aggregates is one of the important constituents which has effect in strength development in the theory that the gaps of coarse aggregate is filled by the fine aggregate and the gaps of fine aggregate is filled by the binding materials. The strength, durability and other characteristics of concrete depends upon the properties of its ingredients on the proportions of mix, water cement ratio, aggregate gradation, aggregate size and shape, cement quality, mixing time, method of compaction and other controls during placing, compaction and curing.

- The objective of this paper is to investigate and compare the compressive, flexural and splitting tensile strength of Steel Fiber Reinforced Concrete with Fly ash and Metakaolin in various proportions in M30 grade concrete with 1% fibres with addition of admixture.

## **SIMULATION OF RAIN WATER HARVESTING SYSTEMS IN K.S.R. EDUCATIONAL INSTITUTIONS**

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### **ABSTRACT**

*Monte Carlo Simulation is that generates random variables for modelling risk or uncertainty of a certain system. The random variables or inputs are modelled on the basis of probability distributions such as normal, log normal, etc. Water scarcity is serious problem throughout the world for both urban & rural community. Urbanization, industrial development & increase in agricultural field & production has resulted in overexploitation of groundwater & surface water resources and resultant deterioration in water quality. The conventional water sources namely well, river and reservoirs, etc. are inadequate to fulfil water demand due to unbalanced rainfall. While the rainwater harvesting system investigate a new water source. The aim of the present study is to use rainwater and thus taking close to the concept of nature conservation. In this study, the rain water harvesting (RWH) system is analyses as an alternative source of water at campus. K.S.R. EDUCATIONAL INSTITUTIONS, TIRUCHENGODE at the STATE OF TAMIL NADU, INDIA. The expected outcome of the study is the development of rainwater harvesting system for catchment area of campus from IT Block, IET Mech Block, B.Ed. Block, PC Block, Academic Block, CE „A“ Block, CE „B“ Block, CE „C“ Block, CE „D“ Block, CE „E“ Block, CE „F“ Block, Women’s Block, CE Boys Hostel, Parking area. The result analysis shows that the present RWH system is having the storage 53,96,816 liters/year and is reasonably well in comparison with conventional water sources. The developed system satisfies the social requirements and can be implemented in rural areas by considering almost all the technical aspect*

### **INTRODUCTION**

Water is the most common or major substance on earth, covering more than 70% of the planet's surface. All living things consist mostly of water (1) For example, the human body is about two third water. Of the total volume of water, only 2 percent (over 28,000,000 Km<sup>3</sup>) is fresh water, which can be used for consumption and for agriculture as given in table 1.2. The average runoff in the river system of India has been assessed as 1869 km<sup>3</sup>. Of this, the utilizable portion by conventional storage and diversion is estimated at about 690 km<sup>3</sup>. In addition, there is substantial replenishable ground water potential in the country estimated at 432 K.m. (2) The per capita availability of water at the national level has reduced from about 5,177 m<sup>3</sup> in the year 1951 to the present level of 1,869 m<sup>3</sup>. For improving per capita water availability in the country, replenishment of ground water resources is a necessity which can be done very effectively through rain water harvesting. (3) The rain water's environmental advantage and purity over other water options makes it the first choice, even though the precipitation cycle may fluctuate from year to year (4) For our water requirement we entirely depend upon rivers, lakes and ground water. However, rain is the ultimate source that feeds all these sources. Rain water harvesting means to make optimum use of rain water at the place where it falls i.e. conserve it and not allow to drain away and cause floods elsewhere. (5) The rain water harvesting may be defined as the technique of collection and storage of rain water at surface or in sub-surface aquifer before it is lost as surface run off. The augmented resources can be harvested whenever needed. The harvested rain water can also be used directly for various purposes, which will improve per capita water availability substantially (6)

### **METHODS OF HARVESTING RAIN WATER**

There are three methods of harvesting rain water as given below:

- (a) Storing rain water for direct use (Fig. 1.1)
- (b) Recharging ground water aquifers, from roof top run off (Fig. 1.2)
- (c) Recharging ground water aquifers with runoff from ground area (Fig. 1.3)

#### **(a) Storing rain water for direct use**

## EXPERIMENTAL INVESTIGATION ON HFRC WITH CONSTRUCTION DEBRIS AS A PARTIAL REPLACEMENT MATERIAL FOR FINE AGGREGATE

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### ABSTRACT

The scope of the present study is to investigate the effect of mineral admixtures such as clay as a cement replacement material and fine aggregate is replaced by 20% debris towards the performance of HFRC. The fibre such as steel fiber 0.2% constant and polypropylene fibre varied from 0.1% to 0.5% with an interval of 0.1% by volume of cement with optimized 0.3% of pp fibre of clay, and 20% of debris at the age of 7 and 28 days. From the experimental work, it was absorbed that 10% of clay and 20% debris in HFRC with 0.2% steel fibre and 0.3% polypropylene fibre plays a vital role in improving the compressive strength, split tensile strength, saturated water absorption test and porosity test performance of concrete at the age of 7 days and 28 days.

### INTRODUCTION

Concrete is the most widely used as construction materials in the world. In fact, concrete is used in virtually everything and there is still no substitutes are available for many of its application. Without concrete, the community and society today could not exist [13]. The demand for concrete increases day by day and hence the demand for the cement that results in more and more pollution. It is also true in the case of river sand as there is a heavy demand for sand and problems in sand mining [12]. Cement is used as a major construction material throughout the world [5]. In environmental point of view, the cement industry is one which most emits polluting gases to the environment, due to the calcium carbonate calcination, as well as to the burning of fossil fuels during the manufacturing process, being responsible for 7% of the worldwide CO<sub>2</sub> emissions [15].

The reasons for partially replacing cement in mortar and concrete with pozzolanic materials are diverse [14]. They include strength enhancement [6,22] and improvement in durability [19]. There are also clear environmental advantages in reducing the quantity of cement used in construction materials. Indeed, cement production is highly energy-intensive process involving significant environmental damage with respect to CO<sub>2</sub> production and raw material acquisition [21]. Among the pozzolanic materials used in the cement industry, blast furnace slag [11] and some activated clays [8] have been successfully tested.

Pozzolana itself possess little or no cementitious value, but it will react with water, it possess the cementitious character [2, 8]. When pozzolanic materials are added to cement, during the hydration of cement the free calcium oxide reacts with the silica present with these materials and forms a new hydration products and improve the durability properties of cement mortar and concrete [16,4, 2, 9].

Demolished waste obtained from a structure mainly made up of concrete has several foreign matter such as various type of finishes, cladding materials, lumber, dirt, steel, hardware's, woods, plastics etc, attached to them directly or indirectly. The process of removal of impurities and crushing of rubble into suitable and desirable aggregate particle size can be carried out in a continuous and sequential manner using appropriate mechanical devices such as jaw crushers, impact crushers, swing hammer crushers etc [18]. To replace the fine aggregate by industrial waste in different ratio such as 10%, 20%, 30%, 40%, and 50% in M40 mix concrete [1]. The optimized values should be referred. The recycled aggregate concrete is used to replacing the natural fine aggregates. Replacing 20% of recycled aggregates are used in natural aggregates this study is to use the demolished concrete waste as aggregate in the production of new concrete. The concrete waste is collected from the local demolished structure [15].

The introduction of fibres in concrete has brought a solution to develop a concrete having enhanced flexural and tensile strength, which are a new form of composite material. In present study polypropylene and steel fibres have been used [7]. Polypropylene fiber is one of the commonly used fiber, due to its easily availability and cheap cost and its consistent quality. For number of reasons the concrete develops cracks. One of the main reason is weakness of the material to resist tensile forces. This crack leads to the structural damage of concrete. Hence to increase the tensile behavior of the concrete,

## EXPERIMENTAL STUDY ON MECHANICAL PROPERTIES OF AMBIENT CURED HIGH CALCIUM FLYASH WITH METAKAOLIN BLEND

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### **Abstract:**

In the present study, the Portland cement was fully replaced with high calcium fly ash to produce the geopolymer concrete. Alkaline liquids were used in different combination in the source material. The alkaline liquids used in this study for the polymerization was sodium hydroxide (NaOH) and sodium silicate (Na<sub>2</sub>SiO<sub>3</sub>). High calcium fly ash was partially replaced by metakaolin blend by 0%, 25%, 50%, 75% and 100%. Ambient curing was given to the high calcium flyash geopolymer mortar specimens. Based on many trials on compressive strength of high calcium flyash geopolymer mortar at 3, 7, 28 days, the optimum mix combination was chosen. Upon the optimum mix combination compressive strength was determined. Test results depict High Calcium Fly Ash Geopolymer mortar specimens attained higher compressive strength at 75% replacement of metakaolin.

**Keywords:** Geopolymer, High Calcium fly ash, Metakaolin, Alkaline Liquid, Strength Properties

### **1. Introduction**

Manufacturing of Portland cement is an energy intensive process and releases a large amount of green house gas to the atmosphere. Recently, another form of cementations' materials using silicon and aluminum activated in a high alkali solution was developed. This material is usually based on fly ash as a source material and is termed geopolymer or alkali-activated fly ash cement. Geopolymers were first developed by Davidovits, consist of SiO<sub>4</sub> and AlO<sub>4</sub> tetrahedral networks [1-3]. The prepared mixture can be subjected to curing at room temperature or at a given temperature. Alumina silicate reactive materials dissolve in strong alkaline solutions and free SiO<sub>4</sub> and AlO<sub>4</sub> tetrahedral structure forms. However, the reaction of the fly ash in the production of geopolymers is low at ambient temperatures [4]. It is also well known that geopolymers possess excellent mechanical properties [5]. Class C fly ash had higher compressive strength than that with Class F fly ash. The mixture of fly ash with 10 molarity (M) of NaOH is suitable for the geopolymer synthesis [6-8]. The strength of the fly ash-based geopolymer increased after exposure to elevated temperatures (800 °C). However, the strength of the corresponding metakaolin-based geopolymer decreased after similar exposure [9]. Geopolymer suffers strength loss after sulphate attack exposure but gains strength with increasing replacement level of fly ash by metakaolin from 5% to 20% and obvious increasing in compressive strength could be observed when the replacement percentage exceeds 15% [10]. The annual output of lignite fly ash from Neyveli Lignite Corporation station 28.5 million tons per annum at Neyveli and one open cast lignite mine of capacity 2.1 million tonnes per annum. This fly ash contains a high percentage of calcium and is being used quite extensively for construction in Tamilnadu. The knowledge of the use of high calcium lignite fly ash in producing geopolymer would be beneficial to the understanding and to the future applications of this material. Therefore, this study focuses on the use of a geopolymer binder for making high calcium concrete which comprises lignite fly ash, sodium silicate and sodium hydroxide solution, and coarse aggregate with partial replacement of metakaolin blend.



## EXPERIMENTAL STUDY ON CERAMICTILES WASTE INCONCRETE REPLACING OF COARSE AGGREGATE

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### ABSTRACT

*In this project we utilise the waste ceramic tiles to replace with coarse aggregate in concrete. Waste Ceramic is one of the most active research areas that encompass a number of disciplines including civil engineering and construction materials. The waste ceramic crushed tiles were partially replaced in place of coarse aggregates by 10%, 20%, 30%, and 40%. M30 grade of concrete was designed and tested. Experimental investigations like workability, Compressive strength test, Split tensile strength test, Flexural strength test for different concrete mixes with different percentages of waste crushed ceramic tiles after 14 and 28 days curing period has to be done. By the usage of optimum dosage of waste ceramic tiles, structural behaviour and ductility properties will be evaluated.*

### 1.INTRODUCTION

#### 1.1 CONSTRUCTION WASTE IN INDIA

In the present construction world, the solid waste is increasing day by day from the demolitions of constructions. There is a huge usage of ceramic tiles in the present construction is going on and it is increasing in day by day construction field. Ceramic products are part of the essential construction materials used in most buildings. Some common manufactured ceramics include wall tiles, floor tiles, sanitary ware, household ceramics and technical ceramics. They are mostly produced using natural materials that contain high content of clay minerals. However, despite the ornamental benefits of ceramics, its wastes among others cause a lot of nuisance to the environment. And also in other side waste tile is also producing from demolished wastes from construction. Indian tiles production is 100 million ton per year in the ceramic industry, about 15%-30% waste material generated from the total production. This waste is not recycled in any format present, however the ceramic waste is durable, hard and highly resistant to biological, chemical and physical degradation forces so, we selected these waste tiles as a replacement material to the basic natural aggregate to reuse them and to decrease the solid waste produced from demolitions of construction. Waste tiles and granite Powder were collected from the surroundings. There are some researchers are also going on solid waste from construction to reuse them again in the construction to reduce the solid waste and to preserve the natural basic aggregates. These researches promotes to use the recycled aggregates in the concrete mix and they got good result when adding some extent percentages of recycled aggregates in place of natural coarse aggregate.

## EXPERIMENTAL STUDIES ON EFFECT OF COPPER SLAG AND FLY ASH IN HIGH PERFORMANCE CONCRETE

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### ABSTRACT

*The conventional concrete has lost its usage nowadays as it does not set out the present need. The term 'High Performance' is because of the essential usage, materials and proportions of this concrete are specifically chosen for properties such as high workability, high density and low permeability. The main objective of this study is to deal with the effects of cementitious materials in High Performance Concrete (HPC) for mix design of M40 grade concrete. Hence, copper slag which is the industrial by-product is used as a partial replacement of fine aggregate by (0%, 15%, 30%, 45%, 60% and 75%) with 20% of fly ash by the volume of cement with water cement ratio 0.36. Super plasticizer conplast Sp430 is used as chemical admixture at the rate of 1.2% of cement which improves the workability. From this experimental study, so far the utilization of copper slag and fly ash observed with gradual improvement in mechanical properties such as compressive, split tensile and flexural strength in HPC. Through this study it is found that, there is improvement in strength of HPC compared to conventional concrete due to presence of copper slag, fly ash and which is higher as compared to the conventional mix M1 while comparing the results with conventional concrete the optimum percentage obtained in 45% copper slag and 20% fly ash with Super plasticizer dosage of 5.72 kg/m<sup>3</sup>.*

**Keywords: Copper slag, Fly ash, HPC, Workability, Super Plasticizer**

### INTRODUCTION

#### A. GENERAL

Concrete is a composite material composed of coarse aggregate bonded together with the fluid cement that hardens cement binder. Nowadays, many studies are going on for increasing the properties of conventional concrete. High performance concrete (HPC) is a concrete mixture, usually enhance the strength, durability and workability qualities to a very high extent when compared to conventional concrete. It is made with carefully selected high-quality ingredients and optimized mixture designs. It is generally essential to use chemical and mineral admixtures in addition to the same ingredients of normal concrete. The supplementary cementing materials are usually added at dosage rates of 5% to 20% or higher by mass of cement. It will have a low water-cementing materials ratio of 0.20 to 0.45. Super plasticizer is an important ingredient in HPC in order to provide good workability and consistency for the concrete matrix. It is always has a higher strength than normal concrete. However, strength is not the primary required property because a normal concrete with high durability and low permeability is considered as high performance properties.

#### B. HIGH PERFORMANCE CONCRETE

High Performance Concrete usually to enhance the strength, durability and workability qualities to a very high extent. It is enhancement of placement and compaction without segregation and long term mechanical properties, early age strength, toughness, volume stability and service life [3]. It can be used in severe exposure conditions where there is a danger to concrete by chlorides or sulphates or other aggressive agents as they ensure very low permeability. This results in carbonation of concrete which destroys the reinforcement and leads to corrosion. It is made with carefully selected high-quality ingredients and optimized mixture designs these are batched, mixed, placed, compacted and cured to the highest industry standards. Plasticizers are usually used to make these concretes fluid and workable. It works out to be economical, even though its initial cost is higher than that of conventional concrete because of the use of HPC in construction enhances the service life of the structure and the structure suffers less damage which could reduce overall costs.

## **A Case study on Current pollution status in Thirumanimutharu basin, Salem district of Tamilnadu**

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### **Abstract**

*The aim of this research was to know the current pollution status in the Tirumanimuttar basin. Since the pollution and abstraction of river in water resources for various purposes are inevitable, an effective decision-making and policy implementation are needed to strike a balance between the development and sustainability. These days, Tirumanimuttar river was heavily contaminated due to the presence of organic and metallic pollutants released from several anthropogenic sources, such as industrial effluents, domestic sewage, and agricultural runoff. It is astonishing to note that even in many developing countries; most of these contaminants are carried through open drains, which enter river premises without proper treatment. This present case study may be helpful for further studies concerning water quality issues in this area, where groundwater is a vital for drinking and other activities.*

Keywords-.Tirumanimuttar basin, Salem districts, Sewage treatment plants, Municipal Corporation.

### **Introduction**

Salem is located at 11° 14' N - 120° 53' N to 77° 44' E - 78° 50' E, at an average elevation of 278 m (912 ft). The city is surrounded by hills: Nagaramalai on the North, Jarugumalai on the south, Kanjamalai on the West, Godumalai on the East and the Shevaroy hills on the North East. Kariyaperumal hill is in South-western Salem. The Thirumanimutharu river flows through the city, dividing it in two. The fort area is the oldest part of Salem. (District Survey Report 2019). Salem has a tropical savanna climate (Köppen climate classification Aw). January and February are generally pleasant; the hot summer begins in March, with the year's highest temperatures during April. Pre-Monsoon thunderstorms occur during April and May. The South West Monsoon season lasts from June to September. The North East Monsoon occurs from October to December. (District Survey Report 2019)

## BEHAVIOUR OF RCC BEAMS SUBJECTED TO DIFFERENT LOADING CONDITION

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### ABSTRACT

*The global demand of concrete is increasing with the increasing need for construction. Concrete is the world's most versatile, durable and reliable construction material. Next to water, concrete is the most used material which requires large quantity of Portland cement. For every ton of OPC produced, nearly one ton of CO<sub>2</sub> is generated and emits large amount of greenhouse gases (essentially CO<sub>2</sub> and NO<sub>x</sub>). To overcome the needs of cement this paper deals with the investigation on cement concrete of grade M20 proportioned with eggshell powder as a substitute mantle for cement. Although, it aims to understand the approaches covered by main research streams in area so as to highlight the advantages and uses of calcium rich material. Developed, developing countries nowadays exploits the potentiality of chicken eggshell powder and in a way they were fruitfully cast it on as an ingredient of animal and poultry feed, land fertilizer and even an excellent substitute option in construction industries. These marginal usages fed in to the minimization of open land disposal scenarios which associates landfill problems, human and environmental health issues. This paper briefly reveals the investigations endured on strength characteristics of conventional cement concrete that are evenly proportioned with calcium rich eggshell powder (ESP and IESP cement replacement of 10, 20, 30, 40 and 50 percentages) and their potential feasibilities were exemplified.*

**Key word:** Chicken egg shell (Raw egg shell powder and incinerated egg shell powder), Strength test, Behaviour.

### INTRODUCTION

Eggs are been predominantly used by humanity in large scale and also small scale industries all over the world and the egg shell waste is commonly disposed without any pretreatment in landfills because it is traditionally futile. Meanwhile egg shell is treated as natural solid waste which is non hazardous, that tang may attract worms and rats, that pretense health crisis to the public. There are many types of disposal such as land fill, open burning, drains clogged up with rubbish and river fill. The outlay for waste disposal is expensive due to the scarcity of land and through large amount waste disposal there pose a contamination in ground water. Therefore, the ways should be found to utilize the waste efficiently by recycling.

Nowadays the waste products from food manufacturing industries are recycled and are used in construction industry to maximize the profit while reducing the amount of construction budget. Egg shells are known to have good strength characteristics when mixed with concrete. Thus eggshells are applicable for the development in construction industry.

### Objectives

## EXPERIMENTAL INVESTIGATION ON TORSIONAL BEHAVIOR OF BEAM-COLUMN JOINT WRAPPED WITH ARAMID FIBER

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### ABSTRACT

*Concrete is a composite construction material plays a vital role in the construction of the nation's infrastructure. In these days, the role of concrete in all type of buildings like sky scrapers and low-rise buildings are enormous. The failure of the Structures are mainly due to the failure of the concrete in Beam-Column Joint. So the Extra care should be given while fabricating the steel in the beam-column joint and also while casting of concrete in the beam column joint. In Recent days more technical researches are going on to avoid the beam-column joint failure. The many repairing methods are mainly based on the fiber as extra admixture. In this Experiment we add the Aramid Fibre in additional with Bacillus sphaericus Bacteria to check the Torsional Behaviour of Beam-Column Joint. Beams-column joint externally wrapped with Aramid fiber was test to failure using an arrangement which transfer Torsional moment to the joint of the Beam-Column through two opposite cantilever moment arms. Aramid Fibre is a class of synthetic fibres and heat resistant. They are fibers in which the strength of the chemical bond can be exploited due to the reason the chain molecules are highly oriented along the fiber axis. Bacteria Introduction may helps in arresting the crack on its own with high volume percentage. The bacteria is the material in which the researches are going to find the usefulness obtained from the bacteria for concrete. The growth of bacteria can be done and the grown bacteria can be used in concrete to check its usage in arresting the cracks and delaying the failure of structure. The experimental work consist of casting RC Beam- Column Joint in controlled Beam-Column Joint, Design for torsion Beam-Column Joint, and fully wrapped with Aramid fiber Beam- Column Joint each 3 specimen and curing this specimen for 28 days and testing this test specimen under "Universal testing machine*

### 1. INTRODUCTION

Concrete is the construction material which is used by all the peoples in the world most widely. It have several limitations like limited ductility, it is weak in tension and little resistance to cracking. Cracks and fissures are a common problem in building structures, pavements, historic monuments and other structural members which are subjected to stress in different service conditions.

Methods currently used for crack remediation often use synthetic polymers that need to be applied repeatedly, which requires continuous monitoring and recurring expenses. Because of these disadvantages of conventional surface treatments, attention has been drawn to alternative techniques for the improvement of the concrete durability and also environmentally friendly. More Researches are going on for concrete to overcome the issues and deterioration.

The need for the improvement in construction practices are in need, since the buildings built with concrete as the time passes deterioration and need for the repair work to be done is compulsory. But the repairing of those type of buildings are Uneconomic and Time consuming. The Introduction of Fiber Reinforced polymers have been used many times in auto motives and aerospace industries. These designs are done with old code of practice. But the New code of practice classify those types of building as unsafe due to its cost consuming in-case of repair works to be done. Introduction of bacteria can help in arresting the crack in concrete. In recent it is found that microbial mineral precipitation in concrete improved the overall



## ANALYSIS OF GROUNDWATER LEVEL FLUCTUATION USING GIS AND REMOTE SENSING IN ERODE DISTRICT

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### ABSTRACT

Ground water is one of the major sources that contribute to the total annual supply. The unstable growth and irregular distribution of population, reduced irrigation practices, rapid urbanization/industrialization, large scale deforestation and improper land use practices creates depletion of ground water. This paper is to review the techniques and methodology applied for identifying Groundwater potential zones using GIS and remote sensing. In order to evaluate the ground water potential zones, thematic maps such as geology, slope, soil, drainage, density maps, Land use and land cover and surface water bodies were prepared, using remotely-sensed data as well as topographical sheets and secondary data are collected from concern department. Thematic layers used for mapping and identification of groundwater zones and analysis the potential. Groundwater potential zones will be useful for effective identification of appropriate locations for extraction of water.

### INTRODUCTION

Groundwater levels change for many reasons. Some changes are due to natural and manmade activities. Some are relatively shallow unconfined aquifers that are affected by surface activities others are deeper confined aquifers. Some aquifers are heavily used for water supply.

Fluctuations are mainly due to three major factors:

- ✓ Change in the volume of water stored in aquifers.
- ✓ Changes in atmospheric pressure.
- ✓ Aquifer deformation.
- ✓ Water level can be easily recognized by the shape of the ground level hydrograph.

Water is essential for survival of mankind. Rainfall is the main source of water which is unevenly distributed. Rapidly increase in population, urbanization, agriculture and industrialization. Water demand becomes more critical in places where rainfall is very low and erratic. India is blessed with higher average annual rainfall of 1170mm as compared to the global average of 800mm, it face more problems of scarcity. Changes in land use and land cover, climatic conditions, population explosion, urbanization. A serious problem is recognized is that sufficient water is not available during the dry season. Water is very sensitive and strongly influenced by the climatic condition and land use/ land cover.

### Land use/ land cover

Land cover is referred to the physical characteristics of earth surface, captured in the distribution of vegetation, water, soil and other physical features of land which is created by human activities. Land use is essential for implementing numerous developments, planning. Land use schemes to fulfil up the demands of human needs. And analyse the urban growth, monitoring the land use/ land cover.

### Objectives

- ✦ To delineate the groundwater potential zones using relevant data are:
  - ✓ Rainfall
  - ✓ Topography
  - ✓ Geology
  - ✓ Soils
- ✦ To develop a GIS model that can identify potential zones based on the thematic maps.
- ✦ To confirm the results of this data.
- ✦ **MATERIALS AND METHODS**

## **TIME AND COST OPTIMIZATION OF CONSTRUCTION PROJECT USING MIVAN TECHNOLOGY**

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### **ABSTRACT**

Mivan is an upcoming technology which has empowered and motivated the mass construction projects throughout the world in this project we have discussed about the pioneering and yet pragmatic approach of this technology with provisions of speed quality financial incentives and construction aspects which is required for a successful completion of mass housing project. The project also includes comparison of aluminium formwork technology and conventional system. This comparison reveals the reduced total cost. Other aspects include its box type construction which proves much advantageous as far as earthquake resistant structure is considered for undertaking mass housing works, it is necessary to have innovative technologies which are capable of fast rate construction and are able to deliver good quality and durable structure in cost effective manner.

### **INTRODUCTION**

Formwork is defined as temporary structure whose purpose is to provide support and containment for fresh concrete until it can support itself. It moulds the concrete to the desired shape and size and controls its position and alignment. The development of formworks is parallel with the growth of concrete construction throughout the 20th century. The advancement of technology, increase of population and the space limitation lead the way to construct

high-rise buildings. But the task was not very easy at the beginning but now the man made the task easy by inventing new machinery and new techniques. The most important factor in terms of cost, quality and speed in a high-rise building construction project is the type of the formwork used in the project.

The mivan Technology System was developed by Malaysian company as an efficient system for constructing the mass housing projects in the developing countries. To be erected by the structural elements many times that to of a repetitive design, the system ensures a fast and economical method of construction. The strong concrete surface finish produced with the aluminium forms allows achievement of an excellent quality wall finish without the need for external as well as internal plastering. This particular system is identified to be very much suitable for Indian conditions for mass structural construction, where quality and speed can be achieved at excellent level that too at economical cost. The speed of construction by this particular system will surpass the speed of most of the other recent construction methods and technologies used Mivan is one of the sophisticated engineered formworks fabricated in aluminium monolithic pouring. Walls, columns, slabs & beam are poured together in particular system. The utilization of mivan formwork in the construction industry of India is comparatively very less as to the other developing or developed countries around the globe. The utilization of mivan formwork technology in construction industry has the greater potential.

. This technology is one of the recent construction technologies upcoming at the greater speed for the successful completion various construction project across Indian construction industry, especially mass housing project. This particular study is very essential because it can provide the necessary important information of the building total cost and complete duration comparison between the conventional available systems and Mivan building system in Indian construction industry, where economy and time both play very important role.

Mivan shuttering is a fast-paced construction technique which offers strength and durability to a building by use of aluminium formworks .With a growing focus on affordable homes and "Housing for All",

## EXPERIMENTAL STUDY ON DURABILITY OF CONCRETE INFUSED WITH CHICKEN EGG SHELL POWDER

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### ABSTRACT

*This experimental study aims to access the performance of concrete with respect to the durability investigations on which cement ie. the binder was partially substituted with eggshell powder which are a known considered residue from egg products production industries. The chemical composition of Egg Shell powder and Incinerated Egg Shell powder is evaluated. In the concrete mix, the cement is partially replaced with egg shell powder (ESP) and Incinerated Egg Shell powder (IESP) as about 10%, 20%, 30% by weight of cement. After 28 days of curing, the compressive strength of concrete is determined. Then the durability aspects where analysed in terms of Sorptivity tests and Rapid Chloride Permeability Test (RCPT). A new principle for Solid waste management was formulated in turns can be able to create a conductive environment.*

**Keywords:** Egg Shell powder (ESP), Incinerated Egg Shell powder (IESP), Sorptivity, Rapid Chloride Permeability Test (RCPT).

### 1. INTRODUCTION

Now - a - days, Concrete plays an important role in the construction industry. Due to the presence of engineering characteristics and properties, concrete is most widely used as a construction material. The major element of concrete is cement, which is the primary producer of carbon di-oxide and green house gas. During the production of 1000 Kg of cement, approximately about 900 Kg of CO<sub>2</sub> is emitted in the atmosphere. The CO<sub>2</sub> produced in the cement industries is the silent killer of the environment and may cause environmental pollution and global warming. In order to reduce this impact on production of cement, the waste by- products can be utilized as the partial replacement of cement. Hence, the Egg Shell Powder is used as a cementing material, which is impregnated to a concrete. Egg shell is a common waste product, which is generated from poultry farms, restaurants and hotels. Egg Shell which is comprised of a network of protein fibers and also associated with the crystals of Calcium Carbonate(CaCO<sub>3</sub>), Magnesium Carbonate(MgCO<sub>3</sub>), Calcium Phosphate( Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>) and also of organic substances. The main component of Egg Shell contains CaCO<sub>3</sub> and the chemical composition of Egg Shell waste is nearly same as that of Limestone. Incineration is a process of waste treatment that involves the combustion of organic substances contained in the waste materials. Therefore, Egg shell Powder and Incinerated Egg Shell powder is used as replacing material for cement on concrete.

## A STUDY ON INSURANCE IN CONSTRUCTION INDUSTRY

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### ABSTRACT

*This paper presents on the insurance in the construction industry. The construction industry plays a vital role in the economy. The construction industry is complex in its nature because it comprises large numbers of parties owners (clients), contractors, consultants, stakeholders, and regulators. Despite this complexity, the industry plays a major role in the development and achievement of society's goals. The need of insurance for the client and contractor in the building construction is very important. Construction is a dangerous and usually unpredictable industry to work in. There are only so many elements of a construction site that you can control and the rest relies on the weather and operational machinery. Construction insurance is required if you work on any construction project or are a construction company. You need to make sure you have the necessary insurance policies covering your business in the unfortunate event something happens to someone onsite, to the building or structure you build, or to any of your construction equipment. It's an expensive business, so it's worth the time and money to insure every aspect of it.*

**KEYWORDS:** Construction, Insurance, Policy, Risk.

### INTRODUCTION

*For a variety of reasons, construction contractors face many uncertainties as they start projects. Construction operations do not always take place according to plans-mistakes occur, workers suffer injuries, property is damaged, and acts of God or other mishaps can impede or halt progress on a construction project. Most of these incidents require money to rectify. The prudent contractor realizes the importance of having adequate insurance and will purchase the types that will offer the best protective coverage for each project undertaken. Insurance is a means of protection from financial loss. It is a form of risk management primarily used to hedge against the risk of a contingent, uncertain loss. An entity which provides insurance is known as an insurer, insurance company, or insurance carrier. A person or entity who buys insurance is known as an insured or policyholder.*

*The insurance transaction involves the insured assuming a guaranteed and known relatively small loss in the form of payment to the insurer in exchange for the insurer's promise to compensate the insured in the event of a covered loss. The loss may or may not be financial, but it must be reducible to financial terms, and must involve something in which the insured has an insurable interest established by ownership, possession, or preexisting relationship.*

### STUDY AREA

There are more insurance companies available for the construction of industries on the needs of contractors and clients. The insurance are made for the companies on the risk basis for the employees and for labors. Based on the requirements, number of insurance companies have been approached and development of the data on the insurance available and more reliable policy adoptable for the clients and contractors, which are analysed on basis of the needs achieved and those policies are listed on the Insurance Regulatory and Development Authority of India.

### MATERIALS AND METHODOLOGY

The study is carried out using a two phase approach in order to achieve the aims and objectives. The methodology is set in order to gather the data in order to achieve the outlined of objectives

- 1) The first was to undertake a literature search on previous publications on insurance as a major risk transfer tool in the construction industry. The Literature review was carried out throughout the whole project, this was to compile and discuss information on insurance as a major risk transfer tool in construction in order to have an in-depth study, and to establish current theory on the use of insurance in construction.

## STUDY ON DEVELOPMENT OF SUSTAINABLE CONSTRUCTION IN OUR COUNTRY

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### ABSTRACT

*Construction has been accused of causing environmental problems ranging from excessive construction of global resources both in terms of construction and building operation to the pollution of the surrounding environment, and research on sustainable building design and using building materials to minimize environmental impact is already underway. Building performance is now a major concern of professionals in the building industry and environmental building performance assessment has emerged as one of the major issues in sustainable construction. However, relying on the design of project to achieve the goal of sustainable development, or to minimize impacts through appropriate management on site, is not sufficient to handle the current problem. The aim of sustainability study goes even further than at the design stage of project to consider its importance at an early stage, before any detailed design or even before a commitment is made to go ahead with a development. The main objectives of this paper are to examine the development, role and limitations of current environmental building assessment methods ascertaining building sustainability used in different countries which leads to discuss the concept of developing a sustainability model for project based on a multi-dimensional approach, and this study also aims to reflect on the weight of the engineers decisions to get a sustainable building, both in choice of materials and in terms of construction and space system adopted, that will allow alternatives to be ranked is discussed in detail in the paper.*

**Keywords** – Sustainability, Sustainable Construction, Sustainable development, Questionnaire,

### 1. INTRODUCTION

#### **Sustainability**

The term Sustainability refers to keeping on effort going continuously or the ability to last out and keep from falling. It denotes the characteristics of a process or state that can be maintained at a certain level for as long as is wanted. Sustainability is defined as the desire to perform activities without any depletion of resources or bringing any harmful effect on the environment. Practicing sustainable construction methods will help avoiding harmful effects from constructions activities.

#### **Sustainable Development**

Sustainable development defined as the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. It also says that ability of a society or ecosystem to continue functioning into the indefinite future without being forced into decline through complete loss of its strength or over loading of key resources on which the system depends.

#### **Sustainable Construction**

Sustainable construction is defined as the practice of creating structures and using process that are environmentally responsible and resource-efficient throughout a building's life-cycle from sitting to design, construction, operation, maintenance, renovation and deconstruction. It can also be said as a way of building which aims at reducing (negative) health and environmental impacts cost by the construction process or by buildings or the built-up environment. It is also a living concept and varies in different scenarios based on people's needs. Taken as the starting point, the definition above has been reinterpreted and expanded based on different approaches and priorities from country to country.

#### **Why Encourage Sustainable Construction**

According to United Environment Programme(UNEP), the increased construction activities and urbanization will increase waste which will eventually destroy natural resources and wild life habitats over 70% of land surface from now up to 2032. Moreover, construction uses around half of natural resources that human consume. Protection and transport of building materials consumes 25-50 percent of all energy used. Taking UK as a sample, the construction industry counts for 47% of CO<sub>2</sub> emission, of which manufacturing of construction products and materials accounts for the largest amount within the process of construction.

#### **Potential Lower Cost**



## **EXPERIMENTAL INVESTIGATION OF COPPER SLAG ON MECHANICAL PROPERTIES OF HYBRID FIBER REINFORCED CONCRETE**

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### **ABSTRACT**

*Concrete is one of the safe, strong and simple building material used in all types of construction works. The main inconvenience in concrete is that the tensile strength is relatively low. The introduction of steel fibers in concrete converts its nature from brittle to ductile. Cracks play an important role in construction as they change concrete structure into permeable elements and with a high risk of corrosion. It is important to reduce the crack width and this can be achieved by adding polypropylene fibers to concrete. In this experimental investigation, the mechanical properties of HFRC containing Copper slag with various percentages of fibers like Steel fiber and Polypropylene fiber is evaluated. The mixes were designed for five different percentages such as 10%, 20%, 30%, 40% and 50% of Copper slag as replacement of fine aggregate with the small percentage of fibers as constant. The mechanical properties of these mixes were found and then comparing those results with the conventional concrete. The optimum dosage of Copper slag has to be found from these results. By the usage of optimum dosage, structural behaviour and durability characteristics will be evaluated.*

**Keywords:** Copper slag, Steel fiber, Polypropylene fiber.

### **INTRODUCTION**

Concrete is the most widely used man-made material on earth. It is an essential construction material used extensively in buildings, bridges, roads and dams. It is a mixture composed of cement, fine aggregate, coarse aggregate and water which hardens with time. The amount of concrete used worldwide is twice that of steel, plastics and aluminum combined. Concrete made from Portland cement is relatively strong in compression but weak in tension and tends to be brittle. The weakness in tension can be overcome by the use of conventional steel bars reinforcement and to some extent by the mixing of a sufficient volume of certain fibers. The use of fibers also recalibrates the behaviour of the fiber-matrix composite after it has cracked through improving its toughness. A fiber is a small discrete reinforcing material produced from various materials like steel, plastic, glass, carbon and natural materials in various shapes and sizes. Fibers are usually used in concrete to control cracking due to plastic shrinkage and drying shrinkage. They also reduce the permeability of concrete and thus reduce bleeding of water. Some types of fibers produce greater impact, abrasion and shatter resistance in concrete. Fiber reinforced concrete (FRC) is a concrete containing fibrous material which increases its structural integrity. It contains short discrete fibers that are uniformly distributed and randomly oriented. In addition, the character of FRC changes with varying concretes, fiber materials, geometries, distribution, orientation and densities. FRC is a new structural material which is gaining increasing importance. Addition of fibers in discrete form improves many engineering properties of concrete. Continuous meshes, woven fabrics and long wire or rods are not considered to be discrete fibers. A composite can be stated as a hybrid when two or more type of fibers is used in a combined matrix that will reflect the benefit of each of the individual fiber used. This will finally provide a synergetic response to the whole structure. Such a composite of concrete is termed as Hybrid fiber reinforced concrete. The mechanical properties of concrete are enhanced appreciably using short lengthened fibers. This increases the modulus of elasticity of the concrete. This will reduce the chances of brittleness and hence small crack, as small cracks are the main factors behind propagation and larger cracks formation. It is observed that the use of a combination of both metallic

## COST MANAGEMNT IN CONSTRUCTION ADMINISTRATION

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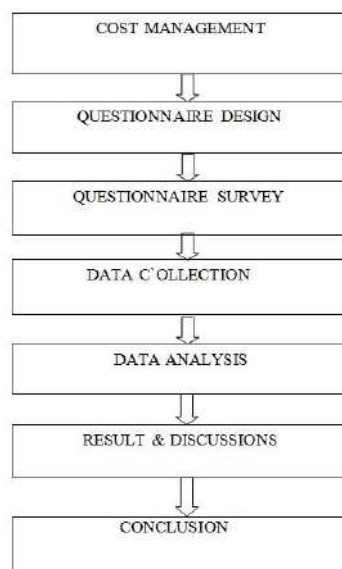
### ABSTRACT

*Construction cost management is the most important function for project success, and the construction project performance is generally expressed in terms of cost and its variance from the budget. However, it has not been effectively used due to the presence of a large quantity of data with many complex interrelationships. Construction firms, being project based organizations, have to develop their project management capacity in order to accomplish firm and project objectives successfully. Hence contractors need to focus on project cost management process. The study presents the limitations, drawbacks and short comings of each project cost management functions related to current practices of domestic contractors, which need to be improved for achieving the predefined project objectives and the profitability of contractors along with the proposed improvement recommendations, through critical literature review.*

### 1. INTRODUCTION

Whether you are developing a new product, designing a facility, or changing a key process, it's challenging to forecast and manage project costs effectively. In fact, the job is so challenging that half of all large IT projects massively blow their budgets, running on average 45 percent over budget and seven percent over time, according to consultants McKinsey & Co. and the University of Oxford. For projects in other sectors, the news is no better. The Project Management Institute (PMI) reported in 2016 that companies were completing only 53 percent of projects within their original budget. However, strong cost management helps you avoid that fate. So what exactly is cost management? Cost management refers to the activities concerning planning and controlling a project's budget. Effective cost management ensures that a project is completed on budget and according to its planned scope. Since you assess the success of a project at least in part by its cost performance, cost management is a prime determinant of project outcome. Cost management activities are conducted throughout the project life cycle, from planning and budget allocation to controlling costs during project execution and assessing a project's cost performance upon completion. Although cost management includes a whole ensemble of activities, it is sometimes referred to in terms of more specific functions, such as spend management, cost accounting, and cost transparency. Cost managers sometimes use these terms as loose synonyms for the broad cost management function.

### 2. METHODOLOGY



## STRATEGIC PLANS FOR DEVELOPMENT OF SMART CITY

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### **ABSTRACT**

Smart city is the city for increasing the specialist of traffic signaling, sewage system, parking, etc... Our project is entitled as strategic plans for development of smart city. Smart cities are expected to be the key to combining a sustainable future with continued economic growth and job creation. The main scope of our project is to achieve the goal, coordinating public and private efforts and improving the living conditions of the citizens. The applications of our strategic planning to urban contexts, Regions and other metropolitan areas is a relatively recent development whose beginning were eminently practical and artistically a mixture of thought, technique and art.

### **KEYWORDS**

Development of urban mobility, Assured electricity supply, Sanitation, Including solid waste management, Public transport, Health and education, Recreation centers, Safety and security of citizen.

### **INTRODUCTION**

A Smart integrates state of the art green technologies to create a city both sustainable and deliver high leveling standards. A smart city leads the way towards CO<sub>2</sub> neutrality and deliver solution (Infrastructure etc..) For its inhabitants that are cause effective and efficient at the same time it is a healthy, energy efficient city that uses renewable energy source as much as possible, including biomass and waste, and is a pioneer in the development of advanced smart technologies.

A Smart city is also an inclusive technologies and innovative solution to increase social inclusion and compact poverty and deprivation. Over all the smart must be a good place to live, offering the best possible quality of life with the lowest possible uses of resources. 'Smart cities' is the latest concept when it comes to building the cities of the future. Smart cities are expected to be the key to combining a sustainability future with continued economic growth and job creations. There are many definitions of a smart city including sustainable, live able, intelligent and green. However, the common denominator seems to be access to data and intelligent tools to connect knowledge and peoples to drive change. What set 'smart cities' aside compared to 'eco cities' and 'Sustainable cities' is which strategic use of new and high Tec ICT- Based solution to connect the citizens and technologies of the city on a common platform.

### **SLUM CLEARANCE AND REHOUSING**

#### **1. SLUM:**

There is no general agreement on the definition of term slum because there are varieties of slums. However, the prime characters of a slum is substandard housing. But a slum is always an area a single neglected building, even in the worst stage of deterioration, does not make a slum. Thus, the area characterized by substandard housing conditions between the city are known as the slum. The term substandard housing condition should be taken in a relative social sense referring to actual living condition reference to a given time in a specific country

#### **2. REHOUSING:**

The complete removal of slum has been recognized as the ultimate objective and slum improvement has been considered as an immediate alternative to given relief to the slum dwellers. The available limited resources should be exploited to the maximum possible extent for providing rehabilitation To the urban poor peoples in healthy and planned colonies. It may "Constraint of resource, Low rent paying capacity of the slum dwellers and it make move from the area selected for clearance. The process of improving the existing conditions of slum is known as the slum clearance. There are two major methods of slum clearance programs can be affected.

- Complete removal method,

## GREEN BUILDING CONJECTURES AND AWARENESS FOR BETTER AMBIENCE

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### ABSTRACT

*Green buildings are marked as economical, resource efficient and environmentally friendly compared to the conventional building. A green building depletes the natural resources to the minimum during its construction and operation. A construction activity generally confers to deterioration of the environment; this is due to the solid waste generated during construction. Production of carbon dioxide by occupants is also considered as a key factor. Due to this problem there is a considerable downturn in adoption of green building technology in construction industry. The main aim of this study is to set forth the factors influencing the adoption of green building. This study investigates the extent of adoption of green building concepts in commercial buildings and the key challenges arising from their adoption with the aim of determining appropriate strategies for implementing them. The study was conducted through survey method and used questionnaires, interviews, observations for data collection. In this paper a study is conducted which determines the concepts and strategies which can help to create awareness among people regarding the worth of green building and to promote green building practice for better environment.*

### INTRODUCTION

#### **General**

Green building practices are commonly defined by the areas of the environment they affect energy, water, site, air quality, and materials. Definitions of green building may range from a building that is “not as bad” as the average building in terms of its impact on the environment or one that is “notably better” than the average building, to one that may even represent a regenerative process where there is actually an improvement and restoration of the site and its surrounding environment. Also green building is defined as one whose construction and lifetime of operation assure the healthiest possible environment while representing the most efficient and least disruptive use of land, water, energy and resources.

The Environmental Protection Agency (EPA) defines green building as the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. It defines green building as the practice of increasing the efficiency with which buildings and their sites use energy, water, and materials, and reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal the complete building lifecycle.

### METHODOLOGY

Although green building is not a new term or new concept to the general public, it is not so easy for people to realize the performance and understand the actual benefit if they has no experience of living in green buildings. Even for people who have experience of living in green buildings, it is uncertain whether the green buildings are able to satisfy their needs.

### Methodology Flow Chart

### DATA ANALYSIS AND RESULTS

### **Case study on traffic congestion at Tiruchengode town**

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#### **Abstract**

*Traffic congestion is one of the major problem in the town due to the growth of vehicles, demand in the transportation modes and growth of population over the nation. But the governments spends a huge budget to solve these type of problems. This traffic congestion problem is studied for the road connecting junction in the tiruchengode town. Due to the congestion, there is risk of accidents because of traffic management and administration is poor. This congestion leads to increase in emissions, increase in time consumptions of peoples, spoils the health of the peoples etc. in this project we documented the studies on how to measure the congestion and recommended for better solution. The study is to reduce the traffic congestion at the tiruchengode junction.*

**Key words:** *traffic intensity and connectivity, traffic volume study, traffic management, intersection points.*

#### **I. Introduction**

One of the most challenging and complicated problem in the town life is that traffic congestion. In the recent years the traffic congestion is made by rapid growth of vehicles populations, structures near the roads. Traffic congestion wastes time and energy, causes pollution and stress, results in traffic accidents, and increase in journey time over the traffic flow. The congestion problem is the common problem among the developed and under developed countries, so it is a global problem over the city also. The study will concentrate on the cause of the traffic congestion on a specific five roads in the Tiruchengode junctions. The essence of traffic congestion is the unbalance transportation of supply and demand. Measures aimed at reducing congestion can be either demand or supply over the town. The purpose of this study is to analysis the traffic pattern and trends for the planning of traffic congestion in the junctions. Primary survey on the basis of traffic congestion over the people in the Tiruchengode town. The traffic congestion during their busy working hours and it means delay to reach their working destination in the proper time over passing the junctions over the town. The congestion problem is common problem among the junctions in the town. The objective of the study is to find the real causes over the traffic congestion on the junctions of connecting the other districts over the towns and to conclude the possible solutions for the problems.

Traffic congestion is when vehicles travel slower because there is too much of traffic on roads. This makes a trip times longer, and increase queueing. This is also known as a traffic congestion. Congestion may results from a decrease in capacity, for example accidents on the road or roads being closed. Bad roads layout also restrict the capacity. Where congestion is common, for example because of commuting in big cities, several methods are used to relieve it. The people may use public transport to travel to other part of the city, such as rapid transit, which travel independently of car traffic and are not affected by traffic congestion.

There are two types of traffic congestion, according to the transportation department are given below,

- Recurring
- Non recurring



## Experimental Study on Plastic Waste as a Coarse Aggregate for Structural Concrete

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### ABSTRACT

*Due to rapid industrialization and urbanization in the country lot of infrastructure developments are taking place. This process has in turn led questions to mankind to solve the problems generated by this growth. The problems defined are acute shortage of constructional materials, increased productivity of waste and other products. In this project M30 grade concrete is taken and waste plastic is used as modifier. Tests were conducted on coarse aggregates, fine aggregates, cement and modifiers (plastic waste) to determine their physical properties. Trail mixes are prepared with 5%, 10% and 15% of plastic aggregates as the replacement for sand in M30 grade of concrete. Based on the mechanical strength of concrete, it is observed that 5% replacement of sand with plastic aggregates is the optimum content.*

**KEYWORDS:** PLASTIC WASTE, MODIFIER, COARSE & FINE AGGREGATE

### INTRODUCTION

As the world population grows, so do the amount and type of wastes being generated. Plastic is everywhere in today's lifestyle. It is used for packaging, protecting, serving and even disposing of all kinds of consumer goods. With the industrial revolution, mass production of goods started and plastic seems to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, building construction, communication or info tech has been virtually revolutionised by the application of plastics.

Use of this non-biodegradable (according to studies, plastics can remain unchanged for as long as 4500 years on earth) product is growing rapidly and the problem is what to do with plastic-waste. Studies have linked the improper disposal of plastic to problems as distant as breast cancer, reproductive problems in human and animals, genital abnormalities and even a decline in human sperm count and quality. If a ban is put on the use of plastic on emotional grounds, the real cost would be much higher, the inconvenience much more, the changes of damage or contamination much greater. The risk to family health and safety would increase and above all the environmental burden would be manifold. Hence the question is not 'plastic vs no plastic' but is more concerned with the judicious use and reuse of plastic waste.

The creation of non-decaying waste materials, combined with a growing consumer population, has resulted in a waste disposal crisis. One solution to this crisis lies in recycling waste into useful products.

Research into new and innovative use of waste materials being undertaken world wide and innovative ideas that are expressed are worthy of this important subject. Many highway agencies, private organizations and individuals have completed or in the process of completing a wide variety of studies and research projects concerning the feasibility, environmental suitability and performance of waste plastic in highway construction. These studies try to match societal need for safe and economical disposal of waste materials with the help of environmentally friendly industries, which need better and cost-effective construction materials.

### COLLECTION OF MATERIALS

Plastic waste are mostly collected are plastic toys, buckets, mug, mixie body parts, grinder body parts which is reusable. Crushing the plastic waste to make powder form. Heat the plastic waste to attain melting point. Compress the material into hardened form using machine. Making smaller size using machine into size suitable for fine aggregate.

### PRELIMINARY TEST

The specific gravity and sieve analysis test is conducted for both conventional and modifier materials. Specific gravity test for cement is also conducted in this study.

## ASSESSMENT OF WATER QUALITY IN KAVERI RIVER (Kaveripatti – Uratchikottai Barrage)

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### ABSTRACT

Water quality of the Kaveri River was assessed to understand the contamination of water due to the presence of various contaminate sources and the suitability of surface water drinking, agricultural, domestic and other purpose. Surface water samples were collected at different locations of Sankari block of Salem District of Tamilnadu state of India. Their physical-chemical parameters like colour, odour, turbidity, TDS, EC, Ph, TA, TH,  $Ca^{2+}$ ,  $Mg^{2+}$ ,  $Fe^{2+}$ ,  $Na^+$ ,  $K^+$ ,  $Mn^{2+}$ ,  $NH_3^+$ ,  $NO_3^-$ ,  $Cl^-$ ,  $F^-$ ,  $SO_4^{2-}$ , and  $PO_4^{2-}$  were assessed. The results were compared with the drinking water guidelines of Indian Standard (IS) In order to understand suitability for drinking, purpose. Water quality index rating was calculated to quantity index rating was calculated to quality the overall water quality for human consumption. The majority of the samples were suitable for drinking, irrigation and domestic purpose in the study area.

**Key words:** Surface water, physical-chemical Parameters, IS, WQI

### 1. INTRODUCTION

#### 1.1 MATERIALS COLLECTION

The current study was designed to investigate the conditions of water quality by randomly collected 10 water samples from Kaveri River from Kaveripatti to Uratchikottai Barrage. Water samples from the selected sites were collected and taken in the pre-cleaned plastic polythene bottles. Prior to sampling, all the sampling containers were washed and rinsed thoroughly with the water. The various sampling location of water samples of Sankari Block as shown in table 1.1

Table 1.1 – Latitude and Longitude of water samples

Cases	Locations	Latitude & longitude
S1	Kaveripatti	11.53°N 77.72°E
S2	Vellalalayam	11.52°N 77.728°E
S3	AyyanarkovilVellalalayam	11.521°N 77.73°E
S4	Annamaarkovil	11.51°N 77.734°E
S5	Pullagoundampatti	11.50°N 77.726°E
S6	Veilayee Amman Temple	11.49°N 77.721°E
S7	Vadakkukadu	11.496°N 77.71°E
S8	Adi Amman Temple	11.49°N 77.711°E
S9	Sri Sivamurugan Spinning Mill	11.489°N 77.70°E
S10	Uratchikottai Barrage	11.48°N 77.703°E

## GROUND WATER QUALITY ASSESSMENT IN AND AROUND SALEM DISTRICT OF TAMILNADU, INDIA

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### Abstract

*The present study was carried out with the aim to assess of water quality using physic-chemical parameters in and around Salem district. People on earth are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. Due to increase of human population, advanced agricultural practices, industrialization, man-made activity, use of fertilizers, water is being highly polluted with different contaminants. Water is an important resource for human survival. Natural water contaminates due to weathering of rocks and leaching of soils etc. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of waterborne diseases. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. This paper is aimed at reviewing the environmental and health impacts of untreated or inadequately treated wastewater effluents. The quality of wastewater effluents is responsible for the degradation of the receiving water bodies. Parameters that may be tested include temperature, pH, turbidity, salinity, nitrates; TDS, sulphate, chloride, alkalinity, phosphates, etc. are of special concern because they produce water or chronic poisoning in aquatic animals. Some water analysis reports with physic-chemical parameters have been given for the exploring parameter study. Guidelines of different physic-chemical parameters also have been given for comparing the value of real water sample. To achieve unpolluted wastewater discharge into receiving water bodies, careful planning, adequate and suitable treatment, regular monitoring and appropriate legislations are necessary.*

*Keywords: Ground water, drinking water, Municipal wastewater, Water quality parameters*

### 1. INTRODUCTION

Water is an essential compound for survival of life on earth. Which contains minerals, important for human as well as for world and aquatic life? Ground water and surface water reservoirs are the planet's most important freshwater resources and provide innumerable benefits. They are used for domestic and irrigation purposes and provide ecosystems for aquatic life especially fish, thereby functioning as a source of essential protein and for significant elements of the world's biological diversity.

Ground water, surface water (rivers, streams and ponds), atmospheric water (rain-water, snow and hail) and springs are the main source of water available to the people in general. The qualities of these water bodies vary widely depending on the location and environmental factors. The major source of ground water is precipitation that infiltrates the ground and moves through the soil and pore spaces of rocks. Other sources include water infiltrating from lakes and streams, recharge ponds and waste-water treatment system. As ground water moves through soil, sediment and rocks, many impurities such as disease-causing micro-organisms are filtered out. Many water resources in developing countries are unhealthy because they contain harmful physical, chemical and biological agents. To maintain a good health however, water should be safe to drink and meet the local standards and international standards to taste, odor and appearance. To monitor the water resource and ensure sustainability, national and international criteria and guidelines established for water quality standards are being used.

Since the chemistry of water directly hints the quality of water for various purposes, its monitoring and assessment gained substantial importance in the present century. A tremendous increase in the population increased the stress on both surface and the groundwater. It is believed at the beginning of the human civilization itself, groundwater was the most trusted form of drinking water because of the filtering effect of the aquifer. However, in the present world drinking the water directly from the source without proper treatment is a tough task. The groundwater analysis for physical and chemical properties is very important for Public health studies. These studies are also main part of pollution studies in the environment. The groundwater contains dissolved solids possesses physical characteristics such as odor,

## EXPERIMENTAL INVESTIGATION ON SEISMIC STRENGTHENING OF MASONRY WALL USING ECO-FRIENDLY DUCTILE CEMENTITIOUS COMPOSITE

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### Abstract

During earthquake, masonry buildings experience seismic loading both in-plane and out-of-plane. The recent earthquakes have created a necessity to review the capability of existing structures during earthquake and to find a suitable strengthening technique to strengthen a newly constructed masonry structure or to retrofit an existing old structure. The results presented are part of a comprehensive experimental study, aimed at investigating the effects of bonding Eco-friendly Ductile Cementitious Composite (EDCC) repair material in improving structural behaviour of hollow concrete masonry walls in seismic-prone areas of British Columbia. Three different specimens are applied in (1:4 cement mortar, EDCC, EDCC with mesh) are tested and results are compared and discussed.

**Keywords:** Eco-friendly ductile cementitious composites (EDCC), seismic strengthening, masonry wall, PP fibre, Pet fibre, GGBS.

### 1 Introduction

In seismic zones, masonry buildings, especially one constructed of plain masonry, are prone to extensive damage during a seismic event because of predominantly non-ductile behavior. In masonry structures, walls are usually supposed to maintain structural integrity and to dissipate the earthquake input energy. Therefore, the strength, ductility and post-peak behavior (stiffness and strength of degradation) of masonry walls are the most important parameters that should be taken into account to improve the seismic performance of masonry structures. The mechanism of stiffness degradation depends on the loading history and the characteristics of walls such as material properties, ductility and geometry. Shear and flexural stresses develop in walls when masonry walls are subjected to lateral loads induced by earthquake. The seismic loads cause both in-plane and out-of-plane actions.

### 2 Review of Literature

Kaheh, Pedram and Shrive, Nigel carried out the research on effect of bonding Eco-friendly Ductile Cementitious Composite (EDCC) repair material in hollow concrete masonry walls in three different thickness. The structural behaviour was evaluated using in-plane free vibration and in-plane quasi-static cyclic loading. The results show the specimen with higher thickness of the three various thickness did not perform better than others.

Gehan Hamdy, Osama Kamal, Osama Al-Hariri, Tarik El-Salakawy carried out the numerical work using ANSYS and experimental work of unreinforced brick masonry walls and vaults strengthened by several techniques to validate the adopted approach. The research aimed to provide a simple and reliable calculation method to enable the design and structural evaluation of strengthening measures for masonry plane.

Angelo Garofano, Francesca Ceroni, Marisa Pecce had done the research on masonry walls strengthened by employing polymeric grids embedded in cementitious mortar layers applied on wall surface. The strength and displacement capacity were quantified by both numerical and experimental work. A parametric analysis was done by varying the masonry strength, wall shape and axial stiffness of the grid and strength of the mortar.

Yang Du investigated the durability performance of Eco-friendly ductile cementitious composite for seismic retrofitting. Six different EDCC fibre mixes were involved to discover the best mix in terms of performance and economical aspects. The mixes with 2% PVA and 1% PVA and 1% PET yields the best durability performance. It was stated that EDCC depends greatly on good material mixing for different good quality control.

Reboul nadege, Mesticou Zyed, Si Larbi Amir, Ferrier Emmanuel carried out the research work on in-plane cyclic behaviour of masonry walls strengthened by composite materials. One reference wall and four reinforced with externally bonded composites were built for the study. These walls exhibited improved behaviour in terms of lateral load and ductility. The strengthening materials contribute more effectively to increase in ductility than FRP composites and proved to be effective in delaying onset of damages.

## EXPERIMENTAL STUDY ON STRENGTH PROPERTIES OF FIBRE REINFORCED CONCRETE (POLYPROPYLENE)

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### Abstract

Polypropylene is a thermoplastic polymer utilized as a part of wide assortment of uses including bundling, materials (e.g., ropes, warm clothing and covers). Polymer cement is a piece of gathering of cements that utilizes polymers to supplement bond as a cover. The sorts incorporate polymer-impregnated solid, polymer cement, and Polymer-Portland-bond concrete. The aim of the study was to achieve maximum strength of concrete by using the optimum weight of polypropylene fibers. Fiber reinforced concrete is used in a variety of engineering applications because of its satisfactory and outstanding performance in the industry and construction field. Polypropylene fiber in concrete mix design is used for multiple purposes that includes rigid pavement, self-compacting concrete and other applications. 40 cylinders of polypropylene concrete were casted and tested for 7 and 28 days' strength for both compressive and split tensile strength. It was concluded that the significant improvement was observed in ultimate compressive strength after 7 and 28 days. The optimum percentage of Polypropylene fiber was obtained to be 1.5 percent of cement by volume. The addition of small amount of polypropylene improved the mechanical properties of concrete.

**Key words:-** Polypropylene, Concrete, fibers, compressive strength, split tensile strength

### 1.INTRODUCTION

Fibre Reinforced Concrete (FRC) may be defined as composite materials made with Portland cement, aggregate, and incorporating discrete discontinuous fibres. The use of polypropylene fibers has increased tremendously in construction of structures because addition of fibers in concrete improves the toughness, flexural strength, tensile strength and impact strength as well as failure mode of concrete. Polypropylene twine is cheap, easily available, and like all manmade fibers of a consistent quality. The Concrete added fiber by weight of cement (0%, 0.5%, 1.5%). Size of Cubes (150 mm x 150 mm x 150mm) and size of cylinder (150 mm dia & 300 mm length) were casted. The compressive strength and split tensile strength of concrete of all mixes was determined at the ages of 7 and 28 days of curing for addition of polypropylene fiber (0%, 0.5%, 1.0%, 1.5%). The fibers were supplied by Reliance Industry by name RECRON 3s. It is available in 3 different sizes. i.e 6mm, 12mm and 24 mm. In the present investigation 12mm fiber length is used.

### 2.LITERATURE REVIEW

**Milind V. Mohod (Jan- Feb. 2015)** The paper deals with the effects of addition of various proportions of polypropylene fibres on the properties of High strength concrete (M30 and M40 mixes)

The main aim of the investigation program is to study the effect of Polypropylene fibre mix by varying content such as 0%, 0.5%, 1%, 1.5% & 2% and finding the optimum Polypropylene fibre content.

The concrete specimens were tested at different age level for mechanical properties of concrete, namely, cube compressive strength, split tensile strength, flexural strength.

Initially the concrete specimen's shows appreciable strength for irregular curing but as the days advances the curing specimens gave satisfactory strength. A notable increase in the compressive, tensile and flexural strength was observed.

**Hussam A. A. Rehman (2012).** This work focus on studying the mechanical characteristics of polypropylene and carbon fiber reinforced no fine aggregate concrete, containing different percentages of fiber.

This work was carried out using several tests. These tests were workability fresh and hardened density, Compressive strength, splitting tensile strength and modulus of rupture.

Tests were performed for Specimens at ages of (7, 28) days.

The percentage increase in tensile strength For polypropylene mixes containing fiber by volume fraction of (1%, 3%, 5%) were (93%, 101% & 129%) respectively and the percentage increase in tensile strength for carbon mixes containing Fiber by volume fraction of (1%, 3%, 5%) were (170%, 177% and 220%) respectively.

**Mahesh Khawashi, Nikita Hatwar, Sandip Kashiwar(2018)**. This paper present the effect of polypropylene (PP) fibre on various properties of concrete such as compressive strength, tensile strength, workability and fractured properties with various content of fibre range of (0%, 0.5%, 1%, 1.5%)



## **ANALYSIS OF MANPOWER RESOURCE IN CONSTRUCTION TO IMPROVE EFFICIENCY**

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### **ABSTRACT**

*The most challenging issue in Construction industry in the last decade is how to improve the production efficiency. Many researchers have been done in the last decade however a deeper understanding is still needed to improve the productivity by studying the workers behavior in construction industry. The performance of labor is affected by many factors and is usually linked to the performance of time, cost, work pressure, safety measures and quality. The aim of this study is to get the latest information and to identify the key factors that affect production efficiency in Tamilnadu by study of workers behavior in construction industry. Data's are collected through questionnaires and distributed to respondents who work at various projects in wide area in Tamilnadu. Respondents were required to rate and analyse using their experience and the factors were identified from past researches, which affects the project performance and then the level is measured based on their affect. The data collected are analyzed using Microsoft Excel or SPSS software which is analytical software.*

### **INTRODUCTION**

Human resource is an important factor in the development of the construction industry and therefore understanding the labour behavior is very much important to improve the efficiency of production. Variations in the construction labour productivity can naturally make a great impact on national economy and productivity. Lack of safety, lack of skills, lack of quality of materials, lack of wages, communication barriers like that are mainly create psychological stress to the labours. It totally affects the labour production efficiency.

Construction labor productivity has become such a word and one of the most frequently researched topics. In most countries, labor cost comprises 30 to 50% of the overall projects cost, and thus is regarded as a true reflection of the economic success of the operation. Horner *et al.* indicated that a 10% increase in construction labor productivity would yield annual savings of about £1 Billion to the British economy; a similar conclusion was echoed by Stoekel and Quirke (1992). Since construction is a labor intensive industry, the significance of this effect not only justifies the concern over its labor productivity, but it can also be argued that labor-power is the only productive resource, hence construction productivity is mainly depend upon human effort and performance.

The objective of this research is to identify and rank the relative importance of factors perceived by Contractors to affect construction labor productivity in Tamilnadu, so that the outcomes can be used by not only local, but also by international industry practitioners, who may be further interested in venturing into potential mega scale projects, but possess no prior practical knowledge of the construction industry in the State, to develop a wider and deeper perspective of the factors influencing the productivity, and provide guidance to projects and construction managers for efficient utilization of the