

# DON BOSCO COLLEGE OF ENGINEERING

Fatorda, Goa - 403 602



## DEPARTMENT OF CIVIL ENGINEERING

2020-2021

# “EcoVille – 2k21”

*.....way towards Sustainable Development*

### *From the HOD's Desk:*

It is a great pleasure to bring out the project idea book “EcoVille – 2k21” that we launched so enthusiastically in the year 2020 which projects the implementation of innovative ideas considering their impact on the environment.

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

Release of “EcoVille – 2k21”, a project idea book of Civil Engineering department is an attempt to improve industry institute interaction.

**Dr. Shwetha P.**  
**Associate Professor and Head,**  
**Dept. of Civil Engineering**  
**Don Bosco College of Engineering, Fatorda-Goa**



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## “RECYCLING TETRAPAKS INTO ECOFRIENDLY BUILDING MATERIALS”

### **Domain / Area of Interest:**

#### **Project Members:**

Mr. Mahesh Biradar  
Miss. Priyangali Bhonsle  
Miss. Edina Gomes  
Miss. Neha Kankonkar  
Miss. Nikita Naik

#### **Project Guide:**

Prof. Starina Dias



### **Brief Idea of project:**

- Manufacturing of Composite boards produced from waste Tetra Pak packaging materials without addition of any admixtures.
- Compare the strength of the conventional Tetra Pak panel with the casted composite board produced from waste Tetra Pak packaging materials.
- The conventional board is 10 x 10 x 0.8 cm with resin as a binder and the casted board size is 7.0 x 7.0 x 1.5 cm without using resin but allowing the melted aluminum and polyethylene as a binder.



**Applications:**

- Boards made from recycled Tetra Pak cartons can be used as an alternative to traditional materials like plywood, fiber board, gypsum boards etc.
- The boards are intended for interior and exterior paneling. These boards can be used as under flooring or as temporary surface protection.
- A possible usage of such waste packaging material might be panel production to be used in the furniture industry as an alternative raw material.
- The potential advantages of such waste for panel manufacturing can be considered as low energy demand, cost-effectiveness, easiness in recovery, and usage of whole material without leaving further waste when compared to conventional methods for wood-based panel production.

**Working Model:**

## TREATMENT OF EFFLUENT USING LOW COST ADSORBENTS

**Domain / Area of Interest: : Environmental Engineering**

**Project Members:**

Omkar Parsekar ( 1611046 )  
Omkar Kotharkar ( 1611032 )  
Sarvesh Halarnkar ( 1711026 )  
Saisha Naik ( 1711039 )  
Tomas Braganca ( 1711004 )

**Project Guide:**

Prof. Prachi Dessai



**Brief Idea of project:** This paper highlights the effective utilization of materials like teak wood powder, mango wood powder, coconut shell powder to analyze the calculation for different parameters. The parameters are considered as an important role for investigation in the adsorption studies for treatment of waste water. Analysis results for different parameters are tabulated graphically to show variations with respect to the different adsorbent dosages. The results determine that mango wood powder was the most effective adsorbent.

**Working Model:** The adsorbents were burnt till charcoal was formed in manual hearth. It was repeatedly washed several times to remove loose materials and lastly washed with distilled water. The samples were filtered using filter paper and dried in the oven at 110°C for 24 hours. The powders obtained from the above materials were then sieved in 75mm sieve to obtain uniformity.



Mango wood powder



Teak wood powder



Coconut shells



Burning of samples in manual hearth



Oven dried adsorbent after sieving



Washing of samples with water



### **Experimental Procedure**

Mango wood powder, Teak Wood Powder and Coconut Shell powder samples were added to conical flasks ranging from 0.5 grams to 10 grams. 100 ml of raw sewage water collected. Then added to all the conical flasks followed by a contact period of 2 hours. Parameters such as pH, turbidity, Alkalinity, BOD and COD were tested at the end of 2-hour contact period and observations were noted. Separate readings were taken of raw sewage sample.

### **Conclusion**

- In the test for turbidity, it was found that mango wood powder was most effective in removing the turbidity of the sewage sample.
- In the test for BOD, mango wood powder was most effective in reducing BOD.
- In the test for COD, mango wood powder was most effective in reducing COD.
- Out of the five parameters tested, we got the best readings for Turbidity, BOD and COD.
- With this experimental study done, we can conclude that mango wood powder was the best adsorbent

## REPLACEMENT OF FINE AGGREGATE BY ALLIED MATERIALS

**Domain/Area of Interest:** Affordable construction product

**Project Members:**

Pawan Arolkar  
Kishan Arondekar  
Aristophanes De Melo  
Sheriton Fernandes  
Shifa Gaunker

**Project Guide:**

Dr. Shwetha Prasanna



**Brief Idea of project:** The project represents the experimental studies carried out from the use of rice husk as partial replacement for fine aggregate in concrete mix. This fine aggregate was replaced by 0%, 5% and 10% by weight for the M-30 mix. The cubes were tested for compressive strength for 7 and 28 days and the result obtained was compared with the nominal mix M-30. The result shows that compressive strength and workability decreases as the rice husk percentage increases. Optimum replacement of sand with rice husk was found to be 5%.



**Applications:** These cubes can be used while constructing internal walls

**Awards and Participations:** Presented “A Review Paper on Partial Replacement of Fine Aggregate by Different Waste Materials” in the International Virtual Conference Recent Innovations in Science & Technology, RIST 2021 on 19th & 20th June 2021, organized by ERANAD Knowledge City Technical Campus, Malappuram, Kerala, India in association with ISET Research & HEXAIND Technologies and Services.

**Working Model:**



## STUDY OF ALTERNATIVE ROUTE FOR BORIM BYPASS USING GIS

**Domain/Area of Interest:** Road, Highway, Transportation

**Project Members:**

Shreelaxmi Desai  
Alithea Fernandes  
Jocelyn Godinho  
Reuben Mascarenhas  
Vedant Fal Dessai

**Project Guides:**

Prof. Jeffrey Valadares  
Sandeep Rivonkar



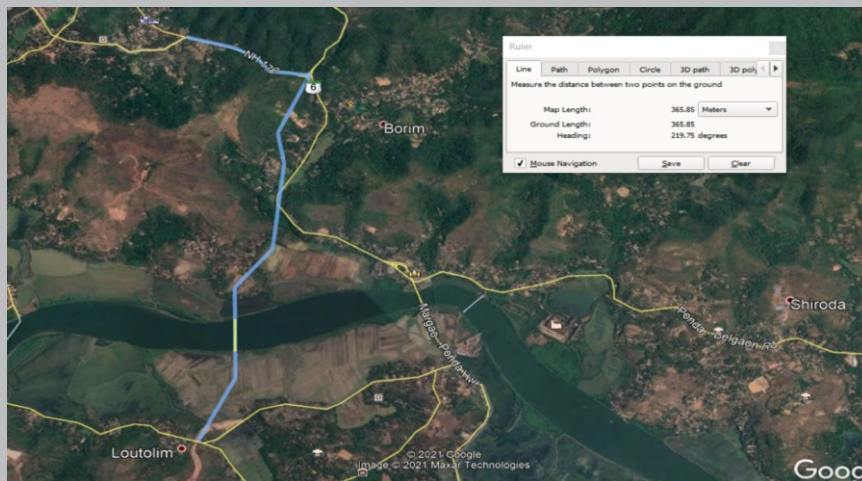
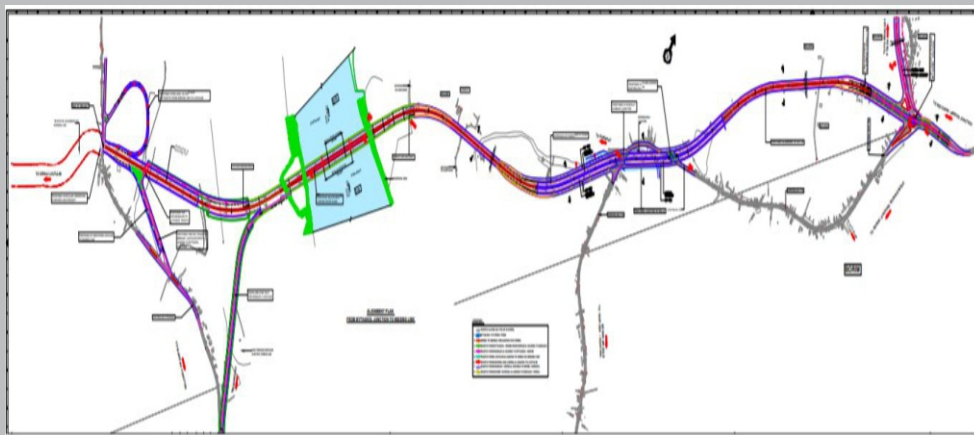
**Brief Idea of project:** The Idea of the project is to establish an economically and strategically significant link from Ponda to Verna, Vasco and Madgaon by constructing a new bridge across River Zuari at Borim, by using GIS software to propose, plan and execute the alignment of the new road efficiently without much use of machinery and manpower for the same.

**Applications:**

- Land/Property Digitization
- Planning & Proposing Road Alignments

- Finding Terrain data
- Determining land use pattern/activity
- Town & Drainage Planning
- Marking Property Boundary

**Final Output:**





## USE OF WASTE MATERIAL AS A PARTIAL REPLACEMENT FOR CEMENT IN MORTAR

**Domain/Area of Interest:** Geotechnical Engineering

**Project Members:**

Mr. Deepam Kamat  
Mr. Omprakash Gupta  
Mr. Aniket Palyekar  
Mr. Vinav Naik  
Mr. Vaibhav Khadilkar

**Project Guides:**

Prof. Kaushik V. Pai Fondekar  
Prof. Akshata Kudchadker



**Brief Idea of project:** The construction industry has recently seen a considerable shift towards use of sustainable and green materials due to rise in pollution and waste which is created by the some of the most basic ingredients during its production which releases harmful gases like carbon dioxide leading to global greenhouse effect and hence results in global warming. Various governmental and international organizations and individuals alike have started working on products that can be used as replacement materials to the ingredients of concrete and mortar such that the use of such materials will increase the strength of the resulting product as well as will be cost effective at the same time. The needs of an

ever growing global population leads to an ever increasing demand of buildings, houses and various other facilities and hence the faster we move towards sustainable and green construction practices better our future will be for us and as well as the environment. In this paper we have tried using cow dung ash as a replacement material for cement that is one the expensive materials among major ingredients of mortar. Cow dung ash is obtained from the when the cow dung is dried for 12 days, heated at around 420-550 degrees Celsius and is cooled and crushed into powder form and then sieved under IS 400 micron sieve. Cow dung ash as a by-product is readily available at cattle farms with negligible price and sometimes is almost free of cost. It has been noted that replacement of cement by cow dung ash has resulted in better strength, durability and workability as compared to conventional mortar mix.

**Applications:**

- Coverage for the plaster when CDA is replaced with cement can be done.
- Investigation on the use of clayey soil mixed with cow dung ash to produce sustainable bricks can be done.
- Further analysis can be done on a combination of CDA and marble stone in concrete.

## “DESIGN OF STRUCTURAL ELEMENTS USING PROGRAM SHEETS”

### *Domain/ Area of Interest:*

#### **Project Members:**

Mr. Vilas Chandrakant Bandekar  
Mr. Xavier Fernandes  
Mr. Abhishek Sadanand Gurav

Miss. Sweta Prabhu  
Mr. Tanmay Sudhir Rane

#### **Project Guide:**

Asst. Prof. Mrs. Nadya Baracho



#### **Brief Idea of project:**

- Learning of Microsoft Excel software using Udemy course.
- Designing of program sheets for different structural elements using the knowledge of excel.

#### **Applications:**

- Designing of One-Way Slab as per IS456:2000.
- Designing of Two-Way Slab as per IS456:2000.
- Designing of Uniaxial Column as per IS456:2000.
- Designing of Biaxial Column as per IS456:2000.
- Designing of Axial Column as per IS456:2000.
- Designing of Steel Beam as per IS800:2007.

# ENERGY SIMULATION USING REVIT FOR STRUCTURES

**Domain/ Area of Interest:** Geotechnical Engineering

**Project Members:**

Leon Mario Rosario de Souza  
Omkar Phadtare  
Jaydeep Pawar  
Pravin Kurtikar  
Sherwin Oliveira

**Project Guides:**

Project Guide: Prof. Prachi Dessai  
External Guide: Fred Noronha



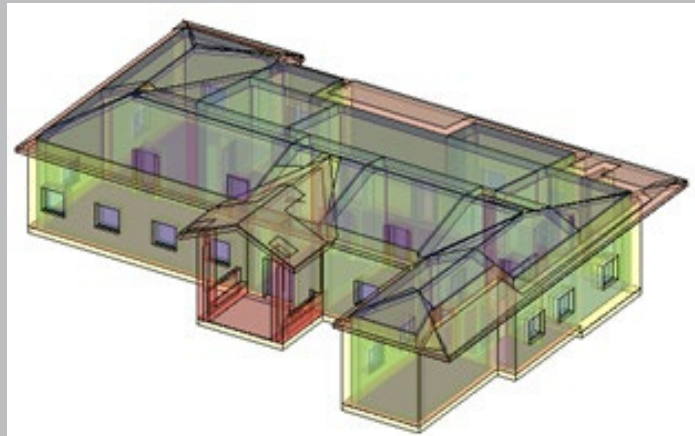
**Brief Idea of project:** The paper highlights the energy performance of materials commonly used in ancient and modern architecture between the 16th and 21st century in Goa, India. Each material is analyzed separately in an individual study to determine their contribution to the consumption of energy. Later, a combination study is carried out to determine the change in performance and interaction with other materials. The BIM model is based on an existing single story, load bearing, pre-colonial structure. The structure was surveyed and modelled in Autodesk Revit and analyzed on Insight360. Material properties were obtained from a literature survey and through testing. Analysis results are

obtained in Energy Use Intensity.

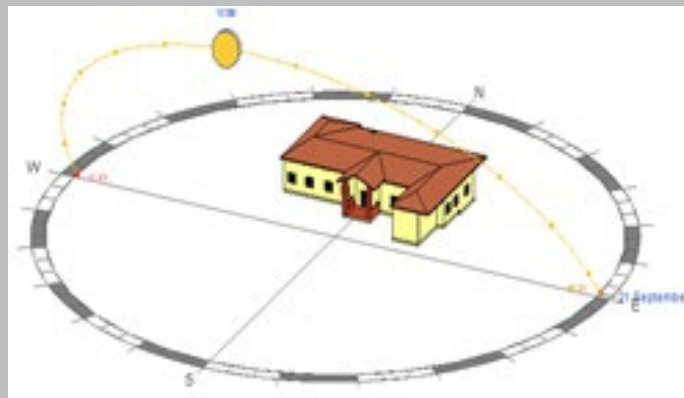
**Applications:**

- Selection of energy efficient construction materials
- Reducing life cycle ad running costs of structures
- Decreasing cooling loads

**Working Model:**



Analytic energy dependent model



Sun path



## ALTERNATIVE TO CONVENTIONAL PLASTER USING LIME AND SURKHI

**Domain/Area of Interest: Geotechnical Engineering**

**Project Members:**

Mr. Tanay S.Naik  
Miss. Sahara R.Naik  
Mr. Rishikesh M.Naik  
Mr. Ashutosh V.Naik  
Mr. Vighnesh K.Gaude

**Project Guide:**

Mrs. Annapurna Sakhardande



**Brief Idea of project:** The objective of this project is to substitute materials used in plaster with low value materials by percentage substitution and confirm their requirements as stated in the relevant codes. In the first stage cementitious materials are replaced with lime and the best mix is obtained will be tested after carrying out partial replacement of fine aggregate with Surkhi.

**Applications:** The Plaster mixes will be used in building construction for application in wall rendering in internal walls for residential/commercial structure.

**Working Model:**



## RATE ANALYSIS OF BUILDING MATERIALS AND ALLIED NEW CONSTRUCTION MATERIALS

**Domain/Area of Interest: Geotechnical Engineering**

**Project Members:**

Pratik Bhandari  
Aditya Kerkar  
Sahil Amonkar  
Shankhesh Ghadi  
Sawrav Chari

**Project Guide:**

Prof. Jeffrey Valadares



**Brief Idea of project: :** After rate analysis of products and labor are known than excel sheet regarding particular type of work for e.g., excavation of labor, cost of products, cost of equipment's, contractors profit is that value will come in one excel sheet which by adding all values the detailed estimate will be given. Say if we give a house for e.g., only of ground floor and it is having area of say 250sqm in that area if we want to construct the house. Say plan came with area of house having 2 bedrooms, bathroom, kitchen, living, etc., by help of excel sheet we will be able determined the cost of structure with contractor profit by just fitting values in excel sheet



we will get estimate of the structure. We are taking g+1 building. From starting of the building construction, the first sheet is rates of material. In this sheets rates of all construction material such as (eg: - cement- there are different types of cement such as slag cement , opc ,ppc , rapid hardening cement etc. )Other materials such as sand, rubble, cement blocks, electrical equipment's, and different types of tiles and rates of such construction materials and also for the rates of new allied products( eg:- M sand , allied paints, AAC blocks etc.) Rates can be seen in the excel sheet. So, for constructing a g+1 house starting from a site cleaning, surveying, and also transportation for a particular type of work can be calculated from labor sheet. (Eg: - Excavation: - For excavation to getting up to depth of 1.5m, the days requirement for this work, the types of laborers and the cost of laborers and also the equipment's and materials required for the particular work can be seen in our particular excavation excel sheet and the estimate for this particular work can be calculated.) Similar to this all works like rcc, steel required, rubble soling, pcc, construction of wall, slabs, beams etc. We have also calculated for finishing works like plastering, tiling, painting, roofing, lighting etc.

**Applications:** Rate analysis of construction materials and estimation of construction works

## ASSESSMENT OF GREEN RATINGS FOR ROADS

**Domain/Area of Interest: Geotechnical Engineering**

**Project Members:**

Mr. Gajanan Bandekar

Miss. . Vaibhavi Naik

Miss. Sonia Naiik

Miss. Priyanka Naik

Miss. Sriyanka Rivanker

**Project Guides:**

Prof. Kaushik V. Pai Fondekar

Prof. Akshata Kudchadker



**Brief Idea of project:** Goa is a tiny state on the west coast of India which is one of the favorite travel destinations among domestic as well as international tourists. Goa being a small state, road transport is one of the most preferred means of transportation with heavy traffic especially during the vacations. As the population in Goa is increasing day by day, the traffic density on the roads is also increasing. This paper focuses on the assessment of green ratings for a selected National Highway which covers major traffic flow over the year. The part of the highway under study stretching from Arlem to Ponda Junction forming major link between several residential areas and public / private working sector always carries heavy traffic on it. This paper contains information about all the necessary

data required to assess and implement green rating system for Arlem to Ponda Junction. A green highway rating system is a proposed standard for quantifying sustainable practices associated with the design and construction of roadways. It requires a stability performance between environment, construction and maintenance of roads. This paper focuses on several criteria like Sustainable Design, Material and Energy Conservation Resources, Water Conservation, etc. for which green ratings are provided based on survey conducted over a stretch from Arlem junction to Ponda junction in Goa.

**Applications:**

- A conventional highway can be transformed into green highway right from design process and shall go through desired modification during construction and maintenance.
- In future, the same concept of green roads can be used to determine green rating for major

## WASTE MANAGEMENT FOR INSTITUTIONAL ESTABLISHMENT

**Domain/Area of Interest: Waste Management**

**Project Members:**

Sankalp Gadekar(1711017)  
Carey Ann Gonsalves(1711023)  
Gavina Sequeira(1711056)  
Umair Shah(1711057)  
Kishan Mangeshkar(1611035)

**Project Guide:**

Asst. Prof. Shruti Jambhal



**Brief Idea of project:** The garbage menace is one of the world's leading problems. The sources of waste generators are not just one or two people, but each and every living being generates garbage in their smallest of activities and hence it becomes the responsibility of all to think meticulously about their own disposal of waste. Educational institutions act like mini cities with amount of garbage generation so this needs to be tackled within the premises so as to cause minimal trouble to environment and create awareness about its need. We tried to inculcate many user-friendly and cheap measures to dispose waste including treating greywater and utilizing it back thereby helping in water conservation.

**Applications:** Schools, colleges, universities and other establishments where substantial amount of garbage is generated of various kinds.

## CASE STUDY OF EVALUATION OF VULNERABILITY TO EARTHQUAKE OF HIGH RISE BUILDING IN GOA

**Domain / Area of Interest: Vulnerability, Parametric study,  
ETABS**

**Project Members:**

Sanket Bhat (1711003)  
Herrick Caldeira (1711005)  
Ray Cortez (1711006)  
Yash Dessai (1711010)  
Godwin Fernandes (1711014)  
Sonia Vasco Da Gama (1711060)

**Project Guides:**

Prof. Oswyn Soare  
Prof. B.R Aniruddha



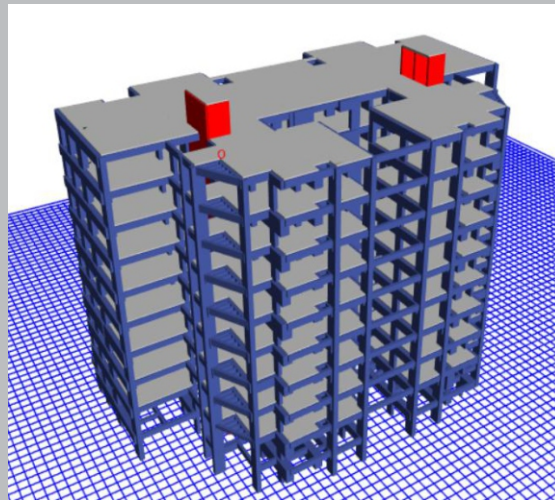
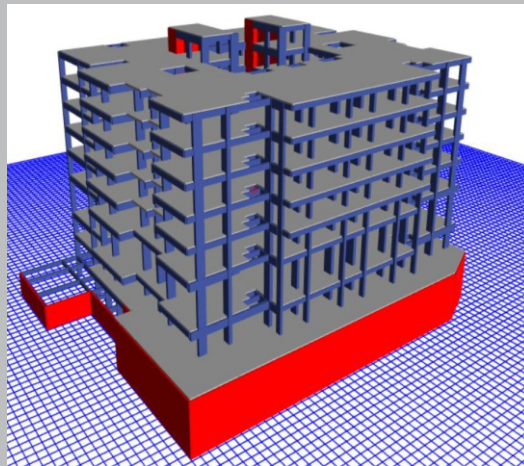
**Brief Idea of project:** The aim of this study is to assess the seismic performance of the Reinforced Concrete (RC) framed structure designed as per the latest Codal provisions . The study aims at evaluating the effect of torsion, eccentricity, geometric configuration ,mass and stiffness irregularities on various parameters like percentage of steel, inter-storey drift, storey displacement, lateral force, storey acceleration(in x, y, z), shear, storey stiffness and overturning moments. At the end of this study,



a comparison of two RC buildings with respect to the above mentioned parameters will be presented to assess the vulnerability of respective structures.

**Applications:** 1) Studying torsion behaviour  
2) Comparison of the effect of irregularities in structures

### Working Model



**MODEL 1 & MODEL 2**

# ANALYSIS, DESIGN AND PARAMETRIC STUDY OF BOX CULVERT

**Domain/Area of Interest:** Structural Engineering

**Project Members:**

Sampada Naik  
Sharyu Pednekar  
Shradha Shirodkar  
Richa Satardekar  
Ankita Phadte

**Project Guides:**

Prof. Swaroopa Sail  
External Guide: Mr. Nitin Gavade



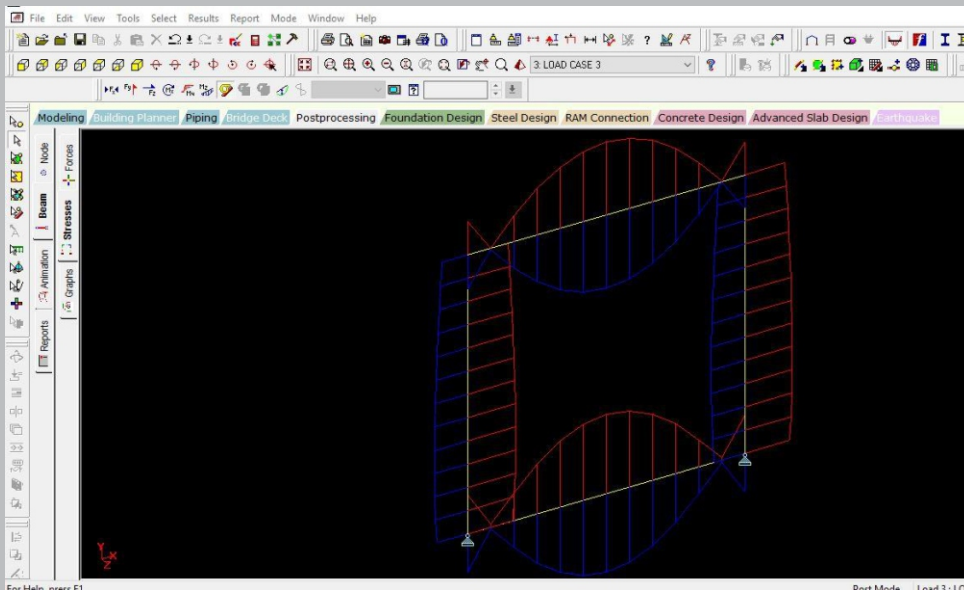
**Brief Idea of project:** Box culverts are ideal for flows where hydraulic head is limited. In the present study an MS Excel sheet is developed, with the help of this sheet user shall be better able to understand the design of box culvert. The study has been conducted on a RCC Box Culvert for different spans and readymade charts/drawing developed for user reference. These charts/drawing covers reinforcement details, bill of quantity (concrete, reinforcement, excavation, shuttering etc.). Charts/drawing developed can be used for initial bidding/Contract purpose. MS - Excel tool is designed as per IRC: 6 - 2000 & IRC: 21 - 2000 and IRC: 6 - 2014 & IRC: 112 - 2011. In the developed tool, provisions are made for IRC-CLASS 70 R,

CLASS-A, CLASS-B and IRC-CLASS-AA loading. The results of analysis and design obtained through developed excel sheet are compared using manual method and through STAAD Pro.

**Applications:** Their traditional use is for diverting watercourses. Used in attenuation tanks, pedestrian subways, access shafts, service tunnels, sea outfalls, road crossings and a variety of other applications. In all cases where strength, durability and economy are of paramount importance.

**Awards and Participation:** Participation in the TEQIP-III Sponsored ONLINE International Conference on ACTM 2021.

#### Working Model:





## UTILIZATION OF IRON ORE TAILINGS AS FINE AGGREGATE IN CONCRETE

**Domain/ Area of Interest:** Sustainable and economical building materials

**Project Members:**

Jasmine Karapurkar  
Sanat Mhapne  
Uddhav Mulgaokar  
Divyesh Naik  
Saishwar Naik

**Project Guide:**

Prof. Satyesh Kakodkar



**Brief Idea of project:** Our Project aims at utilizing the discarded iron ore mine wastes called tailings as fine aggregates in concrete. Combining it with the construction and demolition waste, it is used as a partial replacement of sand in concrete. The effect of IOT on compressive strength of concrete is analysed by producing M30 grade concrete in 5 trials, with various percentages of IOT to find the optimum content. Results showed that at 20% replacement, compressive strength of concrete increased by 30% than the nominal concrete mix containing only sand and no IOT. Hence IOT can be used to improve the compressive strength of concrete.

**Applications:** To manufacture Pavers, Partition walls, tiles

**Awards and Participation:** International Conference on Emerging Trends in Civil Engineering (ICETCE 2021)

**Working Model :**



## RAINWATER HARVESTING AT DON BOSCO COLLEGE OF ENGINEERING

**Domain/Area of Interest: Geotechnical Engineering**

**Project Members:**

Kunal Prabhu Dessai

Yash Kerkar

Bashid Chauhan

Shams Shaikh

Uddesh Naik Dessai

**Project Guide:**

Prof. Satyesh Kakodkar



**Brief Idea of project:** Be it urban or rural, both these communities have a dreadful problem due to shortage of water. Over the years, ground water and other forms of available fresh water have only been over exploited and over used to increasing demand of water by people due to population increase, agricultural purposes, urbanization and advancement in industries. Most of these sources are wells, reservoirs and rivers but lack in filling the demands due to inconsistent rainfall. In the similar fashion, every year even institutions, campuses, educational societies etc have an issue of water. And due to such problems, a need for new source of water becomes inevitable. In this study, rainwater harvesting has been analyzed

as an alternative source of water at the campus of Don Bosco College of Engineering, in the state of Goa, India. Every year rainwater is let off into the drain without utilizing it as there is no existing rain water treatment system. In this paper we will analyze the best way possible a rain water harvesting system can be provided, in the aspects of feasibility and also being economical, And so that it can meet the need of the students, faculty members and most important for agricultural uses.

**APPLICATIONS:**

- The stored water from the ponds at behind of the college will be utilized for the cleanliness of college watering the plants, for grounds, etc. And should be useful for the hostel that will be coming in future at that place the water can be recycled and reused for the same purposes once in a 2/3 years the ponds can be cleaned.
- The stowed water from the subversive reservoir can be filtered and used for the cleanliness of the college, watering the gardens, for grounds, etc. The water can be recycled and reused for the identical purpose. Once in a 1 or 2 years the tanks can be cleaned.