

DON BOSCO COLLEGE OF ENGINEERING

Fatorda, Goa - 403 602



DEPARTMENT OF CIVIL ENGINEERING

2019-2020

“EcoVille – 2k20”

.....way towards Sustainable Development

Guided by: Dr. Shwetha P.
Designed by: Prof. Swaroopa Sail

From the HOD's Desk:

It is a great pleasure to bring out the project idea book “EcoVille – 2k20” 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 – 2k20”, 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



CONTENT

Domain: Sustainable construction materials

I	Geotechnical Engineering
	1. Stabilization Of Soil Blocks Admixed With Sugarcane Baggase Ash
	2. Probabilistic Analysis Of Slope Stability
	3. Earth Block Stabilization Using Natural Fibers
2	Building Materials And Construction
	1. Manufacturing Of Building Material Using Industrial Waste
	2. Design Of High Strength Concrete Using Alccofine
	3. Utilization Of Stone Dust For Pavement Blocks
	4. Sustainable And Affordable Plaster
	5. Experimental Study On Cement Based Light Transmitting Building Material
3	Environmental Engineering
	1. Application Of Green Building Concept For An Existing Structure
	2. Experimental Investigation On Usage Of Waste Material As Partial Replacement Of Cement And Fine Aggregate
	3. Domestic Waste Water Treatment For A Residential Bungalow
	4. Design Of Catchment Area And Water Supply Scheme For Don Bosco College Of Agriculture

STABILIZATION OF SOIL BLOCKS ADMIXED WITH SUGARCANE BAGGASE ASH

Domain / Area of Interest: Geotechnical Engineering

Project Members:

De Souza Maryann
Gaude Yatish
Gavandalkar Aakash
Patil Rhea
Prasad Anushuka

Project Guides:

Guide: Dr. Shwetha P.
Co-guide: Prof. Swaroopa Sail



Brief Idea of project: The construction industry is making rapid strides all around the globe. The soil stabilized blocks admixed with SBA has more compressive strength than conventional concrete. The effect of sugarcane bagasse ash on soil blocks were studied and later different other materials were used in combination of soil and sugarcane bagasse ash (SBA) to prepare the blocks. The blocks with different proportions were tested for compressive strength with 100% soil, 80% soil & 20% cement and 0% soil, 10% cement and 10% SBA were tested. It was concluded that addition of SBA in soil block gives the required compressive strength.

Applications:

- 1) One of the applications of soil cement is SSB; laterite soil is used to fabricate the soil blocks with the help of cement as a stabilizing agent.
- 2) Utilization of profuse material to manufacture sustainable product using a high Stabilized Soil Block(SSB) used for the construction of walls, pillars, buildings and so on.

Working Model:

PROBABILISTIC ANALYSIS OF SLOPE STABILITY

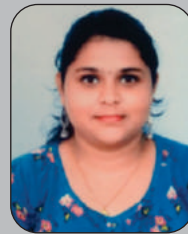
Domain / Area of Interest: Geotechnical Engineering

Project Members:

Miss. Luiza Nozomia Fernandes
Miss. Sadia Shaikh
Miss. Saily Uday Naik
Mr. Shital Kumar Jain

Project Guides:

Guide: Prof. Jeffrey Valadares
Co-guide: Prof. Madhuraj Naik

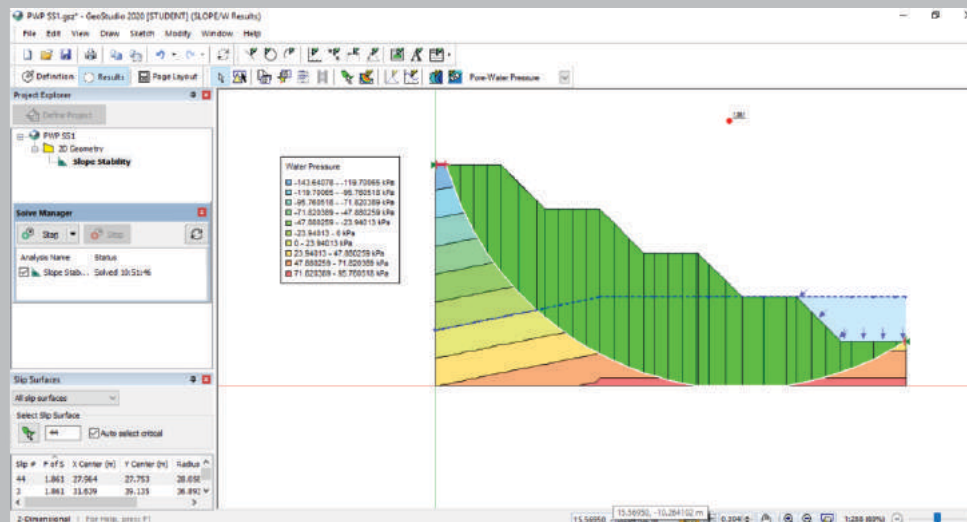


Brief Idea of project: Nowadays people like to construct their houses on hilly areas for the purpose of aesthetic view, to enhance the natural ventilation in their houses to make houses more energy efficient, for this purpose soil stabilization is a must thing to be done. Different stabilization techniques are studied, Factor of Safety of the Slopes is modelled in GeoStudio Software using with pore water pressure, and Seepage conditions. Also 11 Case studies were being studied during the project. We also carried out Slope Stability manually by Swedish Slip Circle method to cross check with the results obtained on GeoStudio.

Applications:

- 1) Slope stability is required to prevent an inclined surface from sliding or collapsing and to ensure a safe design for the natural and man-made slopes.
- 2) Based on Slope stability analysis we can go for the suitable analysis we can go for the suitable soil stabilization techniques and can use the sloppy areas for construction to give better aesthetic appearance.
- 3) GeoStudio can be used to model different slopes to find out the factor of safety of each slopes and provide necessary soil stabilization techniques.
- 4) Swedish Circle Method can also be used to manually check the results and compare the same with that of GeoStudio.

Working Model:



EARTH BLOCK STABILIZATION USING NATURAL FIBERS

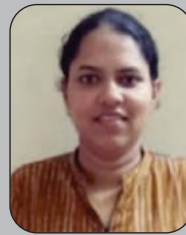
Domain/Area of Interest: Geotechnical Engineering

Project Members:

Mr. Nathan dias
Mr. Viany Furtado
Miss. Subrata Rai
Miss. Danira Vaz

Project Guides:

Guide: Dr. Shwetha P.
Co-guide: Prof. Akshata Kudchadker



Brief Idea of project: Soil blocks are usually stabilised with cementing materials, fibres or chemicals to improve their performance properties for construction purpose. Eco-friendly and sustainable building material that mitigates the problems caused by some of the construction materials. This study aims to investigate the effect of natural fibers (coconut fibre) as stabilizers on engineering properties of stabilized earth blocks. Blocks were prepared using local soil collected from a depth of 0.5 to 1 m from Navelim, Salcete, Goa, India. Compressed blocks containing cement, soil and coconut fibers at various percentages were prepared. This study

investigated the optimum proportion of coconut fibre and cement suitable for earth Block. It was found that blocks stabilized with coconut fiber can withstand small deformations. The project concludes that the inclusion of the coconut fiber in the compressed earth blocks generally improved the performance properties of the blocks. It was concluded that soil stabilized with cement and coconut fiber can be used as a low cost construction material.

Applications:

- 1) It increases the utilization of local material and reduces the transportation cost as the production is insitu, makes quality housing available to more people and generates local economy rather than importing materials.
- 2) They are also used in military applications like the security construction including barriers and blast blockers.

Working Model:



MANUFACTURE OF BUILDING MATERIALS USING INDUSTRIAL WASTE

Domain/Area of Interest: WASTE MANAGEMENT

Project Members:

Mr. Saiesh Karwarkar
Ms. Aafrin Khan
Ms. Akshata Fatarpenkar
Mr. Deeptesh Morajkar
Mr. Sainil Priaolkar

Project Guides:

Guide: Prof. Satyesh A.S. Kakodkar
Co-guide: Prof. Gawrish Samant



Brief Idea of Project: In the past, the construction industry was one of the most established and biggest industries in the unorganized sector giving abundant employment to the individuals. The Indian construction industry is an indispensable part of the economy and a channel for a substantial part of its advancement investment, is ready for the development by virtue of industrialization, urbanization, financial turn of events and individuals' rising desires for improved nature of living. In order to build said infrastructure, there is a need for materials, most importantly Building materials.

Glass fiber reinforced plastics (GFRP) which are ordinarily utilized in the development, transportation, and vehicle divisions have been considered naturally hard to reuse due to the cross-connected nature of thermoset resins, which cannot be remoulded. The disposal of FRP wastes is a critical issue for all composite industries. The thermoset GFRP is being incinerated or landfilled in the environment.

In this study, we have made use of waste glass powder from Pentair for the manufacturing of various building materials like Concrete blocks, Pavers and Fly ash Bricks made with the addition of composite fillers (glass powder) in place of sand in different ratios. The glass fiber helps in giving extra strength and acts as reinforcement. These materials are used in different proportions and several trials are conducted to obtain different products with enhanced strength and economy. Hence, creating an alternative green and sustainable product.

Awards and Participation:

- 1) The Goa state Innovation Council in association with education committee of GCCI hosted the ' Goa State Innovative Project Competition 2019-20 '.
- 2) The first round was conducted at Don Bosco College of Engineering, Fatorda and the second round at Goa Engineering College, Farmagudi.
- 3) In all 159 projects were submitted, of which 12 were shortlisted for the final round. Unfortunately, due to COVID-19 Pandemic, the final round is pending.

Working model:



DESIGN OF HIGH STRENGTH CONCRETE USING ALCCOFINES

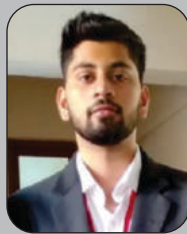
Domain/Area of Interest: Concrete Technology

Project Members:

Bhomkar Diksha
Bodke Shrinivas
Deshprabhu Arya
Endro Jeremy

Project Guides:

Guide: Prof. Oswyn Soares
Co-guide: Prof. B. R. Aniruddha



Brief Idea of Project: The increase in the demand of construction materials in the construction industry has led to the increase in the necessity of producing high strength concrete. This investigation is carried out to study design mix of high strength concrete (HSC) of M100 grade. To improve the strength and durability of concrete, mineral and chemical admixtures were added and also the normal river sand was replaced with manufactured sand to get better results. Compressive strength test was conducted on the concrete cubes to find its compressive strengths.

Concrete cubes of M40, M50, M60 grade were cast and compressive strength at 7 days and 28 days were determined using compressive strength testing machine. For M40 and M50 grade concrete, MasterRheobuild SP11 was used as admixture with a dosage of 1.5% and 1.9% respectively. For M60 grade concrete, Masterglenium SKY was used as admixture with a dosage of 0.7%.

Applications:

- 1) HSC helps in the reduction of member size and self-weight
- 2) HSC is used in High-rise structures and bridges
- 3) It decreases the number of supports due to the increase in spans

Working Model:



UTILISATION OF STONE DUST FOR PAVEMENT BLOCKS (MDP)

Domain/Area of Interest: Environmental Engineering

Project Members:

Ibrahim Shaikh
Sohan Navelcar
Irfan Agwan
Poojan Kamat
Sahil Tari
Sarvesh Rao

Project Guides:

Guide: Prof. Prachi Dessai



Brief Idea of project: Paver block are used as a pavement which can be maintained easily and if any problem occurs can be replaced easily. It gives us variety in quality i.e. size, shape, colour and thickness with rates cheaper than concrete pavement. It carries load generally greater than identical sized reinforced blocks. Paver blocks can be classified accordingly loading (traffic condition) non traffic, light traffic, medium traffic, heavy traffic, very heavy traffic. In this paper we will study the effects on paver block by replacing cement with marble dust. In this thesis we will study the amount of cement which can be replaced without affecting the strength of concrete. The aim of the project is to produce

environment friendly paver block which solves disposal problem of marble dust and increasing strength of concrete. Test results obtained suggests that no three materials at a time can be used to replace cement but 10% replacement with marble dust powder respectively gives good results than normal cement concrete so this proportion can be adopted as it costs cheaper than normal concrete for paver block.

Applications:

- 1) Since the Marble Dust powder is a waste product and is harmful to the environment if left exposed to wind and water, utilization of MDP in construction materials helps in saving the environment.
- 2) The Marble Dust powder acts as a filler material between the cement particles, hence decreasing the porosity of hardened concrete.
- 3) As per the tests conducted on the mix design for paver, the maximum compressive strength is obtained at 10% replacement of cement with Marble Dust powder.
- 4) The compressive strength with 10% replacement of cement with Marble Dust powder increases by 39%.

SUSTAINABLE AND AFFORDABLE PLASTER

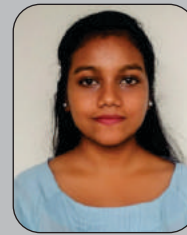
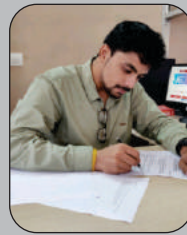
Domain / Area of Interest: BUILDING MATERIAL

Project Members:

Miss. Samrudhi Kavlekar
Miss. Sumedha Komarpant
Miss. Shruti Mauzo
Miss. Divya V. Naik
Miss. Manuja Naik
Miss. Aishwarya V. Naik

Project Guides:

Guide : Asst. Prof. Annapurna Sakhardande
Co-guide : Asst. Prof. Kaushik Pai Fondekar



Brief Idea of project: In our project we have partially replaced cement with low value materials like fly ash and Ground Granulated Blast Furnace Slag (GGBS) with the conventional materials like PPC and river sand in conventional plaster. Project also aims to make the plaster affordable and sustainable, durable, resource efficient by reuse of this low value materials. Experimental procedures for project was carried out by part replacement of 15%, 25%, 35%, 45%, 55% replacement of fly ash with cement and part replacement of 15%, 25%, 35%, 45%, 55%, 65%, 75%, 85% replacement of GGBS with cement. Part replacement of cement with fly ash was done

for mixes ranging from 1:3 to 1:6 and ggbs was done for mixes ranging from 1:3 to 1:5. Various tests conducted necessary for plaster yielded the best mixes. These best mixes were further estimated and rate analysis was carried out to in turn get affordable and sustainable plaster mixes.

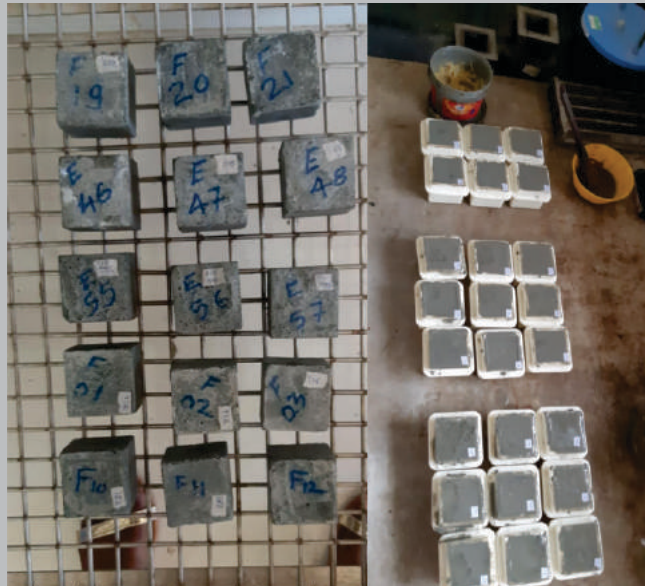
Applications:

The purpose of plastering is to give desirable finish to an uneven surface. In addition to this it increases the strength and attractiveness of the surface. It is basically a decorative and a protective coating on the surface.

Our project aims at making the plaster affordable and sustainable by reuse of low value material. The replacement of cement is done at various percentages with flyash and GGBS to achieve the same. The use of flyash GGBS decreases the water demand and improves the workability of the plaster mortar.

- To ensure affordable, reliable, sustainable plaster .
- To encourage reuse of low value materials .
- To reduce the effects on the environment .

Working Model:



EXPERIMENTAL STUDY ON CEMENT BASED LIGHT TRANSMITTING BUILDING MATERIAL

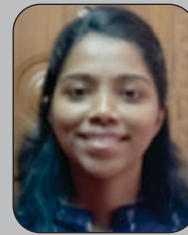
Domain/Area of Interest: Concrete Technology

Project Members:

Nivedita Naik
Riya Naik
Tanushree Saraswat
Prathamesh Palkar
Saiprasad Naik
Darshan Varkuri

Project Guides:

Guide: Asst. Prof. Shruti Jambhale
Co-guide: Asst. Prof. Nadya Baracho
External Guide: Mr. Fred Noronha



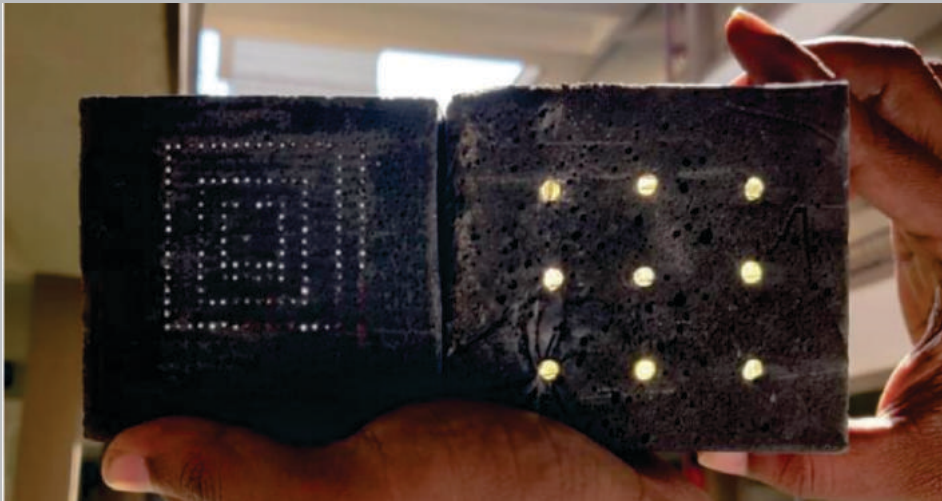
Brief Idea of project: The aim of our project of casting a light transmitting building material is to reduce the operating energy of the buildings by exploiting the great amount of potential energy available to us in the form of solar energy or sunlight. Another added feature is the pleasing aesthetics that these building materials can offer that can improve the image of concrete which is perceived as dull and unattractive. With the same percentage replacement of the optical fibers and resin tubes there is a great difference in cost. It can even be seen that along with cost savings the blocks cast with resin tubes present a better look. From the

experimental study conducted, conclusion can be made that resin is equally efficient in transmitting light through a concrete block as compared to optical fibers

Applications:

- 1) Used to make green buildings (the building can have fewer lights to meet its demand for lighting).
- 2) Used in cold countries to transmit heat with light.
- 3) Used as a building material for interior and exterior walls.
- 4) Used as flooring a passable surface illuminated from below

Working Model:



APPLICATION OF GREEN BUILDING CONCEPT FOR AN EXISTING STRUCTURE

Domain/Area of Interest: Green Building

Project Members:

Miss. Anissa Twyla Zilda De Sa

Miss. Sayeeli Kannaik

Mr. Shrikant Naik

Mr. Sahil Dessai

Project Guides:

Guide: Mrs. Prachi Dessai



Brief Idea of project: Green Buildings emphasize on the resource usage efficiency and also press upon the three R's- reduce, reuse and recycle. The technique of Green building maximizes the use of efficient construction materials and practices, boots the use of natural sources and sinks in the surroundings, uses highly proficient equipment for the indoor area and also uses proficient methods for water and waste management. Implementation of green concept can lead to reduction of carbon emission by 35%, water usage by 40%, solid waste reduction by 70%, and reduction in energy consumption by 50%.

We will be using Don Bosco College Of Engineering Fatorda, Goa as a study site for our project. We will be estimation the amount of LEDS, FANS, TUBELIGHTS etc. With their current prices and energy consupmtion. The record of electricity bill which our college is paying to Goa electricity dept. Will be considered. Using the terrace for construction of Solar power plant will be suggested with approximate cost of plant how much energy it will generate and in what years we can compensiate the construction cost of solar power plant.

And using the green building techniques and materials we will be checking how much our college can earn green credits according to IGBC green building rating system .

Applications:

1. Suggesting appropriate methods for converting existing structure to a green structure will help in improving indoor environmental quality, health and thermal comfort and human perception.
2. The use of sustainable building materials in construction will help in reduction of energy consumption.
3. It will give the passive and active hybrid approach to the building design.
4. Green structures have very high initial cost and a long term economic benefit.
5. It will help in reducing the consumption of fossil fuels by replacing it with renewable resources like solar energy.
6. The conversion of existing structure to a green structure by use of green building techniques will help in achieving a green building certification from LEED.

EXPERIMENTAL INVESTIGATION ON USAGE OF WASTE MATERIAL AS PARTIAL REPLACEMENT FOR CEMENT AND FINE AGGREGATES

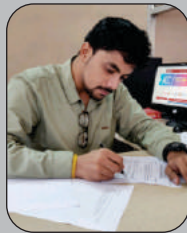
Domain/ Area of Interest: Concrete Technology

Project Members:

Crasto Brandan
Gaude Alisha
Gawas Pooja
Gomes Lizbeth
Kankonkar Tanvi

Project Guides:

Guide: Prof. Kaushik V. Pai Fondekar
Co-guide: Dr. Neena S. P. Panandikar



Brief Idea of project: Egg shell contain calcium carbonate while fly ash is rich in siliceous matter and can be used to partially replace cement in mortar. In this project attempt has been made to study the effect of addition of egg shells and fly ash as partial replacement of cement and addition of glass powder as replacement of sand by comparing their compressive strength with that of control mix. Cement to sand ratio was 1:3. First set of experiment was carried out by replacing 2.5%,5%,7.5%,10%,12.5%,15% of cement with ESP and second set was carried out by replacing 10%,11%,15%,20%,25%,30%,35% of cement by FAP. The third

set is replacing 10%,20%,30%,40%,50% of sand by glass powder while not replacing cement. Hardened specimen was tested for compressive strength for 7 and 28 days. It was found that compressive strength of mortar increased above control mix on partial replacement of cement by 7.5% of ESP. No increase in strength was found on partial replacement with FAP. Partial replacement of sand with glass powder showed a gradual increase in mortar strength upto 40% and then a decrease.

Applications:

- 1) The mortar can be used to develop pavers upon further study.
- 2) The cement mortar can be used for plaster.

Working Model:



DOMESTIC WASTEWATER TREATMENT FOR RESIDENTIAL BUNGALOW

Domain / Area of Interest: Environmental Engineering

Project Members:

Harish Kamanache
Pranav Kudaskar
Floyd Lobo
Aditya Patil

Project Guides:

Guide: Ms. Starina Dias
Co-Guide: Mrs. Prachi Dessai



Brief Idea of project: The presence of pollutants in the wastewater poses environmental disposal problems, if they are directly let into surrounding water bodies without proper treatment because of their non-biodegradable properties. The issue of grey wastewater management – includes water coming out from bathroom, kitchen sinks and laundry water, this does not include waste water coming out from the toilets – is reportedly gaining huge attention, especially in the developing countries where insufficient wastewater management has a significant negative impact on public health and the environment. In the recent years, the

insufficient management of wastewater (grey wastewater) has not only been linked to environmental deterioration and serious public health risks, but has also been increasingly identified as a precious resource rather than just a wastewater. Appropriate reuse of grey water not only reduces not only the use of drinking water for irrigation purpose, but also improves public health and surrounding environment. The rural areas, mainly, the grey water is directly used for agricultural needs without proper treatment and any measures taken, thereby leading to environmental damage and putting the health of population around it at risk. Though this wastewater (greywater) is comparatively less polluted than sewage and factory wastewater, it still contain high quantity of microorganisms, suspended solids and carbon substances such as oil, fat, soaps, detergents, and other household chemicals. This project was conducted to test if the material like laterite, sand and charcoal can be used to treat grey wastewater economically and effectively in a specified tank dimension.

Applications:

- 1) Toilet Flushing.
- 2) Gardening or Irrigation.
- 3) Non-potable uses.

DESIGN OF CATCHMENT AREA AND WATER SUPPLY SCHEME FOR DON BOSCO COLLEGE OF AGRICULTURE

Domain/Area of Interest: Geotechnical Engineering

Project Members:

Yash Aijaonkar
Gautam Zangli
Pallavee Velip
Siddesh Tirodkar
Shubham Jadhav

Project Guides:

Guide: Prof. Satyesh Kakodkar
Co-guide: Prof. Akshata A.S Kudchadker



Brief Idea of project: Water has its influence on the traditions, customs, economy, and politics of this country. Raincentre is a hub that showcases permanent exhibitions used to spread literacy in water conservation in society. People came to know-how to harvest rain through such center. They provide tools to the people to be leaders and be with them in this water conservation moment. They started to restructure a society of water literates. The rain centers prove to be a milestone in the campaign on Jal Swaraj. Educational institutes have a strong impact in spreading water education by establishing rain centers. That proves to be an

important step to encourage society. The especially technical institute should take lead in this activity. The keynote that has to remember that before establishing a rain center its potentiality should be checked to design a cost-effective system for long term use. To establish as a rain center, the potentiality of Don Bosco College of Agriculture, Sulcorna has checked in terms of the material, labors, and economy. First, we decided that capacity level of storage water to increase by modifying the existing sources available.

Second, as the college fields were not closely placed to the college structures, we decided we can have wells being constructed beside these fields, as it will be very convenient for watering of the plants rather than wasting electricity and money for pumping the water from the river or any water source. Also, these will help in increasing the groundwater level, which will help in maintaining the groundwater throughout the year.

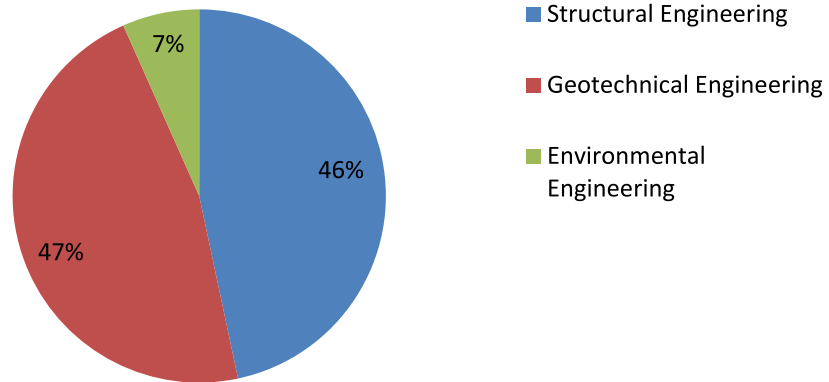
Third, for all the college structures we can have roof rainwater harvesting systems along with ground recharge pits and wells constructed. These will help in diverting the rainwater and storing it in the tanks which are placed beside the college structure, and the extra water can be diverted towards the recharge pits. During the dry season, water can be used from the storage tanks if the well water is insufficient or dried up. These pits maintain the ground water level and also level of water in the well.

We have decided to choose all these procedures since the sources will easily be available, economically be feasible and for such a vast project for the next 10-15 years to be sustainable without any water crisis or monetary losses.

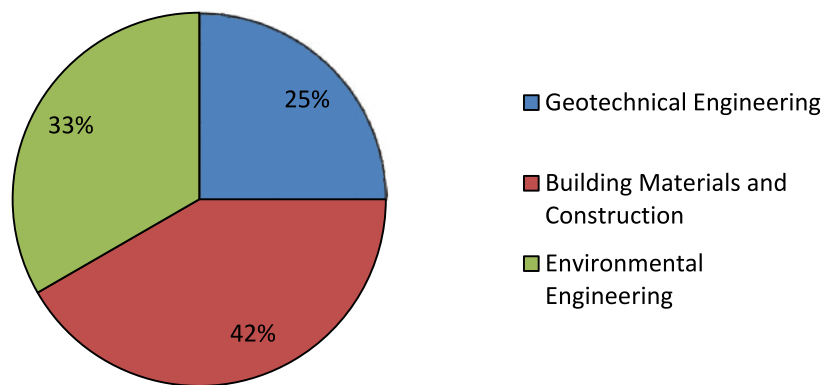
Conclusion:

Rain center was successfully designed for Don Bosco College of Agriculture. The previously constructed water source has been modified. A detailed report about the rainwater harvesting system is prepared and suggestion on the placement of this system was made as it has to be used where there is a cluster of structures since it will help in tapping the maximum amount of water and it will be convenient to store and pump water. The best, latest, and most effective methods were suggested to the building for the rainwater harvesting. Detailed estimate is provided for the construction of a single tank and building of a single well within the report.

Faculty Specialization



Project Domain



BATCH: 2016-2020
DEPARTMENT OF CIVIL ENGINEERING



Editorial

“Believe in yourself! Have faith in your abilities! Without a humble but reasonable confidence in your own power, you cannot be successful or happy.”

- Norman Vincent Peale

We take immense pleasure in presenting to you the first edition of “EcoVille – 2k20”, which reflects the perfect amalgamation of nurturing creativity and inspiring innovation for successful education along with sustainable development. “EcoVille– 2k20” provides an insight into the range and scope of the imagination and creativity of our final year civil engineering students of year 2016-2020.

Foremost, I would like to express my sincere gratitude to our Director, Rev. Fr. Kinley D'Cruz for his continuous support, encouragement and enthusiasm in all our endeavors. Secondly, I wish to acknowledge our Principal, Dr. Neena Panandiker for her guidance and motivation. I am grateful to our HOD, Dr. Shwetha P. for her insights which helped put things into a new perspective. Thank you for sharing contextual knowledge and advice given to the students by all the faculty members of Civil Engineering Department while working towards successful completion of their respective project work.

Congratulations to all students for functioning effectively as a leader in a team work and for enhancing ability to engage in independent and life-long learning in the broadest context of technological development.

Edited by:
Prof. Swaroopa Sail, Assistant Professor
Dept. Project Coordinator
Dept. of Civil Engineering



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

Vision

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

Mission

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