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EMAARAT

A MAGAZINE BY DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2022-2023

THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY

Thakur College of Engineering & Technology (TCET) was established in the academic year 2001-02 with a clear objective of providing quality technical education in tune with international standards and contemporary global requirements. The College is recognized by the All India Council for Technical Education (AICTE) & Govt. of Maharashtra and is affiliated with the University of Mumbai (UOM). All the courses at the U.G. level, eligible for accreditation in 2011 i.e. Electronics & Telecommunication (EXTC), Information Technology (IT) and Computer Engineering (CMPN) were accredited by NBA for three years w.e.f. 16.9.2011. Moreover, these programmes are also given permanent affiliation w.e.f. A.Y. 2015-16. The management's commitment to excellence and relevance in technical education is reflected in the marvellous infrastructure that is comparable to the finest institution of its type in the country.

The imposing fivestoried building - housing state-of-the-art computer laboratories, spacious classrooms, well-equipped laboratories, workshops, computer centre with a server room, a well-stocked library, wide and well lit clean corridors and a large canteen, conference hall, seminar halls has set new standards in providing facilities of international level. The application of modern technology in the teaching-learning process and effective day-to-day governance of the college makes TCET unique. Key initiatives like teacher guardian scheme, book bank scheme, induction of resource books, yearly organisation of events (like Multicon-W, technical and cultural festivals etc.) make TCET an institute with a difference. Thus, within just 15 years of its existence, TCET has carved out a niche for itself as one of the leading engineering Colleges under the University of Mumbai in Maharashtra

DEPARTMENT VISION

"TO BECOME A DEPARTMENT OF NATIONAL RELEVANCE IN THE FIELD OF CIVIL ENGINEERING"

DEPARTMENT MISSION

"THE DEPARTMENT OF CIVIL ENGINEERING IS COMMITTED TO PROVIDE UNDERGRADUATE STUDENTS WITH SOUND KNOWLEDGE IN THE FIELD OF CIVIL ENGINEERING AND BUILD IN THEIR LEADERSHIP AND MANAGERIAL SKILLS ALONG WITH INCULCATING THE CULTURE OF LIFELONG LEARNING AND SOCIAL SENSITIVITY"

DR . SEEMA JAGTAP

PhD Technology (Civil Engineering)
M.Tech Civil (Hydraulics Engineering)
B.E (Civil Engineering)

It is very much apparent that we live today in a world that is so very different from the one we grew up in, the one we were educated in. Change in today's world is riding at an accelerated pace and we need to pause and reflect it on the entire education system. I firmly believe that students must be taught how to think, not what to think. That reminds me of the great words of wisdom by Aristotle, "Educating the mind without educating the heart is no education at all. "We as the essential parts of the science and civil engineering fraternity, it becomes our duty to look through the horizon of any information we receive, appreciate and acknowledge the findings of our civilization, and to also address its flaws.

We here at TCET Civil Department are proud to provide the students with a platform through our departmental magazine "EMAARAT" to exhibit their grit and guts. The magazine reflects as the mirror of the findings and qualitative research of the students.

I feel privileged to be a part of such a fascinating venture, our students, behind the editorial and digitization of the magazine, and those who have provided us with their thoughts, both have done a spectacular job, and deserve an enormous amount of gratitude that I here want to convey on the behalf of the department. Also, throughout the academic year, our ASCE Students Chapter has provided us with the best opportunities and experiences the student fraternity could ask for. My greeting and best wishes for all those associated with the effort of the publication of this magazine.

> **"Determination is doing what needs to be done even when you don't feel like doing it."**

ASCE Student Chapter
Thakur College of Engineering & Technology

MRS. RUTUJA SHINDE

M.E (Water Resources & Environmental Engineering)
B.Tech (Civil)

Education is not a mere accumulation of facts; it is the preparation of life itself. Education is knowledge imbued with wisdom and ethics. It develops the personality of the students, molds their character, and develops mental skills to help them cope with the problems and challenges of the complex world of today.

One of the most significant character traits that need to be instilled in our youth during their education is a finely ingrained attitude of service- before self. The aim is to make them successful not only in life but also conscious of their duties and responsibilities towards their fellow citizens. It gives me immense pleasure to pen words for yet another issue of our Civil department magazine "EMAARAT". The magazine aims to put together the best creative work of our students. I am thankful to TCET and the rest of its fraternity and extended family for letting me with numerous ventures like this magazine.

> "You may never know what results come of your action, but if you do nothing there will be no result."

It is always a pleasure to be a part of a team that strives to bring out the talents of students and staff. TCET has always been striving to keep itself ahead of the competition and the results are now for everyone to see. My message to students is that you should endeavor to be better human beings, while foraying in competitive life, realizing your dreams, and when you get the opportunity flash it out with your genuine talent among you.

MST. JATIN SHETIGAR

ASCE WEBMASTER
SE STUDENT

"Creativity is inventing, experimenting, growing, taking risks, breaking rules, making mistakes, and having fun." -- Mary Lou Cook

Being in the creative team is the same job as mom and dad in one person. The strategy and tactics for the stories, the cover design, the theme, the layout, those are our children. They need to be nurtured, guided, given rules, socialized, corrected, taught, and nurtured some more.

To me, creativity is optimum unbiased solutions to complicated issues unleashed through any medium – digital, written, spoken. In this process, we envision what isn't and we figure out how to bring it to pass. Some have argued that teamwork can offer greater creativity and productivity than working as an individual. From my experience perspective, I would agree with this. Combining ideas and experiences from various minds can greatly increase the success of the project. Relating to the title 'EMAARAT' I believe, you can't build a great building on a weak foundation. You must have a solid foundation if you're going to have a strong superstructure. Our team, I call it my solid foundation, we have collectively worked on every aspect of the design that is in front of you. From rough designs to collocating elements for creating the final design, we have poured our heart out to build our strong superstructure.

A vote of thanks to everyone who has constantly contributed to the success of the magazine!

I hope you enjoy the read!

> **"A leader is not the one who only takes the lead but the one who makes sure no one is left behind."**

MISS. AVANI GALA

ASCE PUBLICATION HEAD
SE STUDENT

EMARAAT has been a perfect platform to show up our findings and the knowledge we gained, the creativity and artwork we display, the writing skills we grasped, and most importantly the experience we shared. This magazine gives the wholesome of all what we learned and acquired.

Creativity? It can be defined in multiple ways, if you ask a creative person what inspired them to create something, they might not be able to give you one concrete answer. Because being creative is all about expressing yourself.

Doing it all the time, regardless of our mood, gives us ownership of our writing ability. It takes it out of the realm of conjuring where we stand on the rock of isolation, begging the winds for inspiration, and it makes it something as doable as picking up a hammer and pounding a nail. Writing may be an art, but it is certainly a craft. It is an easy and workable thing that can be as steady and reliable as a chore.

Some painters transform the sun into a yellow spot, and then some with their art and their intelligence, transform a yellow spot into the sun.

On behalf of our team, I would like to offer a word of thanks to our readers, contributors, authors, editors, and anonymous reviewers, all of whom have volunteered to contribute to the success of the magazine EMAARAT.

> **“Always dream and shoot higher than you know you can do. Don’t bother just to be better than your contemporaries or predecessors. Try to be better than yourself.”**

ASCE Student Chapter
Thakur College of Engineering & Technology

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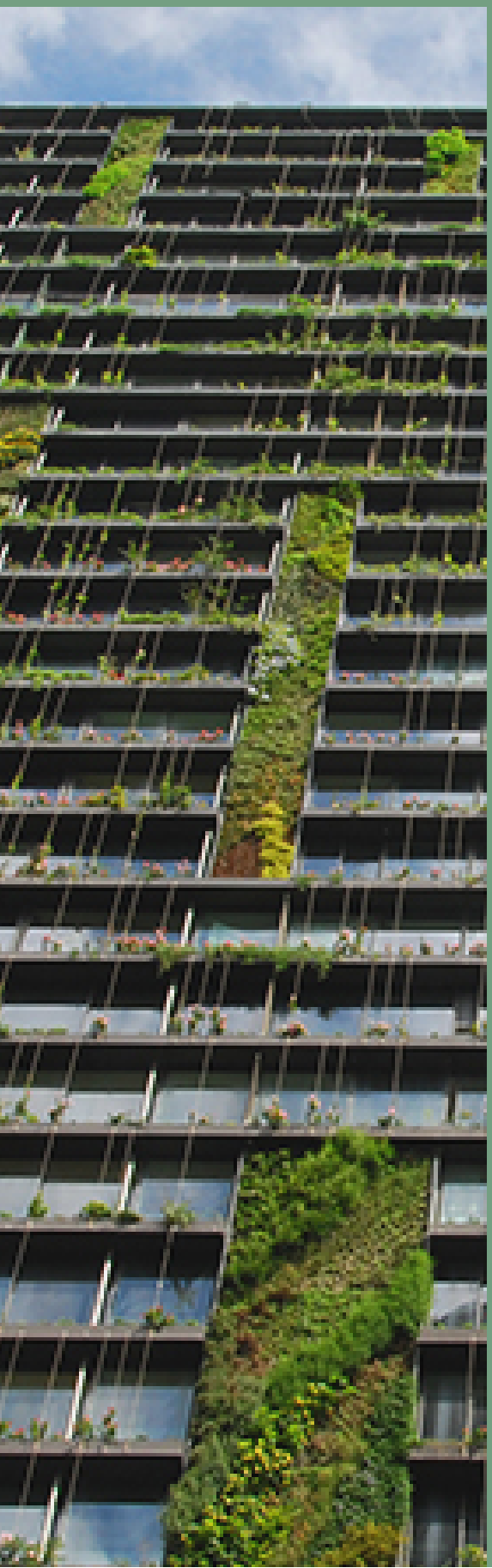


INDUSTRIAL VENTURE

FACULTY WISDOM

STUDENT CONTRIBUTION

CREDITS

ASCE Student Chapter
Thakur College of Engineering & Technology

INDUSTRIAL VENTURE

NIRANJAN MEHTA

•What drew you to be a civil engineer?

Actually, civil engineering was not the engineering that i was typically planning to go for .Since i was left by a few marks for electrical engineering, my principle suggested me to go for civil engineering instead and that's when I selected civil engineering.

•What qualities do you think a student should develop to become a competent civil engineer?

I think a student should possess a never quitting attitude and should be passionate towards the field, since civil engineering in itself is a challenging field and one can not sustain in it without such mindset.

•What factors should a fresher student take into consideration while starting with a project ?

First of all a student must be aware of his scope of work in the project and should have all the factors required to carry out the project. He/She should have a good repo with the workers on site and all his team members.

•Can you tell us about the issues you solved at your last project ?

My role in my last project was as a plumbing contractor, and i had to provide a proficient services plan to the developer which saves him money.

•What are some challenges faced by freshers when entering the industry ?

Work experience is the biggest issue every civil engineer faces when entering the practical world. To overcome this problem, one should gain some on site experience during their academics to have a head start ahead of time.

•According to you, how important is job experience?

Job experience is major key to becoming a competent civil engineer, in order to become a great civil engineering in any field of civil engineering be it road works, repairing or any of it one should have a great work experience which comes by working under someone highly experienced. To obtain great work experience does not mean one has to work for a certain period of years.

•According to you what are some upcoming development in the field of civil engineering?

According to me, Navi Mumbai and out skirts of Mumbai are going to see great development down the years. There will be a lot of weightage given to sustainable architecture. These developments will provide a lot of job openings for civil engineers.

•Can you tell us about your views on the upcoming green technology in civil engineering?

I definitely support the green technology involvement in construction industry. This will lead to significant decrease in CO2 emissions on part of India. Green technology will lead to whole transition in construction industry never seen before.

•There's upcoming development in managing waste during construction, what are your views on the same?

It's a great initiative to promote reduce reuse and recycle movement. This step will lead to a significant reduction in waste being dumped every year. This trend has already took off as we can see recycled blocks being used in buildings and plastic roads being built.

ABHIJIT PHANSE

•What drew you to be a civil engineer?

Civil name itself denotes society, some thing for society growth

•What qualities do you think a student should develop to become a competent civil engineer?

No special requirement only follow Ethic

•What factors should a fresher student take into consideration while starting with a project ?

Study the basic need and purpose of the project

•Can you tell us about the issues you solved at your last project ?

Many issue, which will benefit the project in term of cost and time

•According to you, how important is job experience?

It's just similar to what u feel before you enter any swimming pool.

•What are some challenges faced by freshers when entering the industry ?

Jobs in market also flow w.r.t supply and demand ratio. Hence recommend to choose right time and place or continue for postgraduate studies 6. It's just similar to what u feel before you enter any swimming pool.

•According to you what are some upcoming development in the field of civil engineering?

Infrastructure project like high speed railways, Green building, Underground linear project, Artificial intelligence , BIM etc.

•Can you tell us about your views on the upcoming green technology in civil engineering?

To make socio economic viable green technology is always stand at top priority list.

•There's upcoming development in managing waste during construction, what are your views on the same?

Waste is always a challenge faced in all industries. There are many researches to convert construction waste but due to fund issue it's not implemented. Even though mandate laws are available it is not been followed. Authority should make stringent laws and penalty is only solution to manage waste.

FACULTY WISDOM

ARTICLE 1

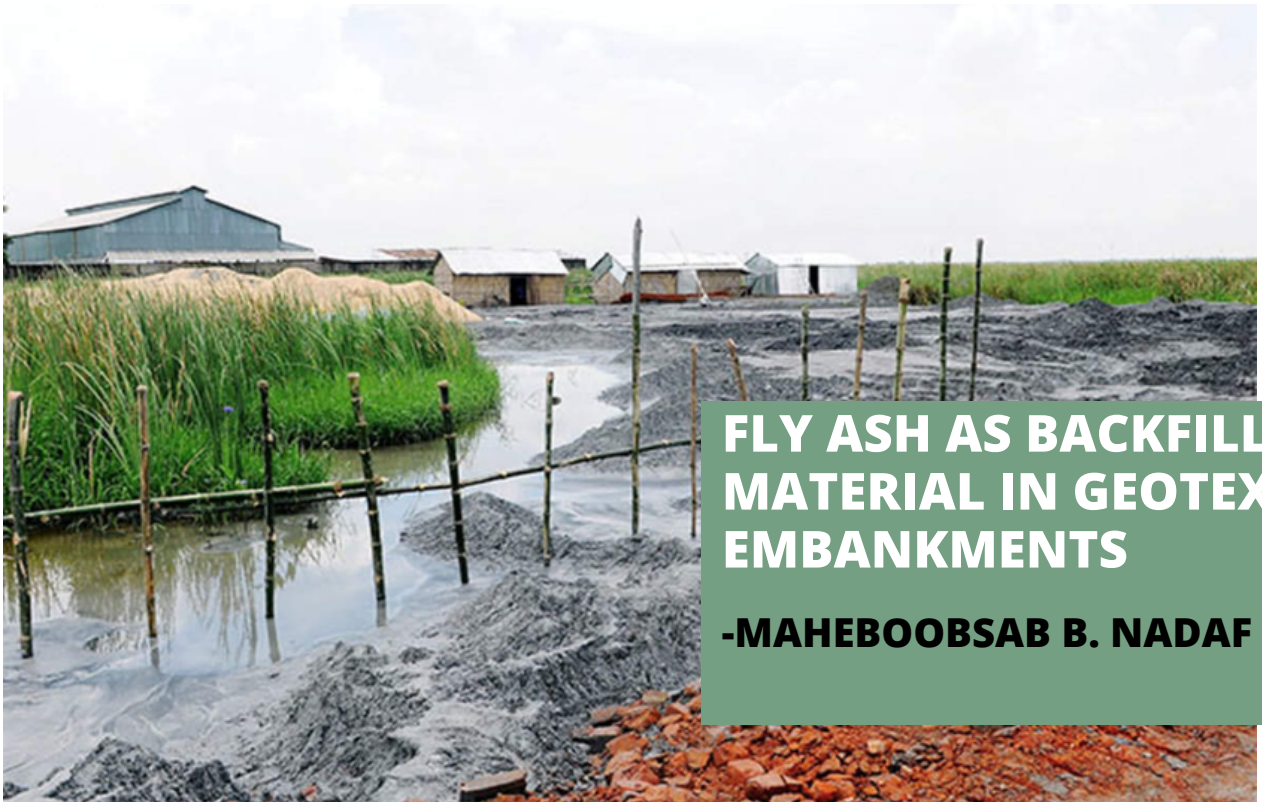
FLY ASH AS BACKFILL MATERIAL IN GEOTEXTILE EMBANKMENTS

-MAHEBOOBSAB B. NADAF

ARTICLE 2

RESOURCE MANAGEMENT OF INFRASTRUCTURAL PROJECT FOR FUTURE CITIES: A RE MODIFIED MINIMUM MOMENT METHOD

-PALLAVI PATIL, KARTHIK NAGARAJAN , RAJU NARWADE



FLY ASH AS BACKFILL MATERIAL IN GEOTEXTILE EMBANKMENTS

-MAHEBOOBSAB B. NADAF

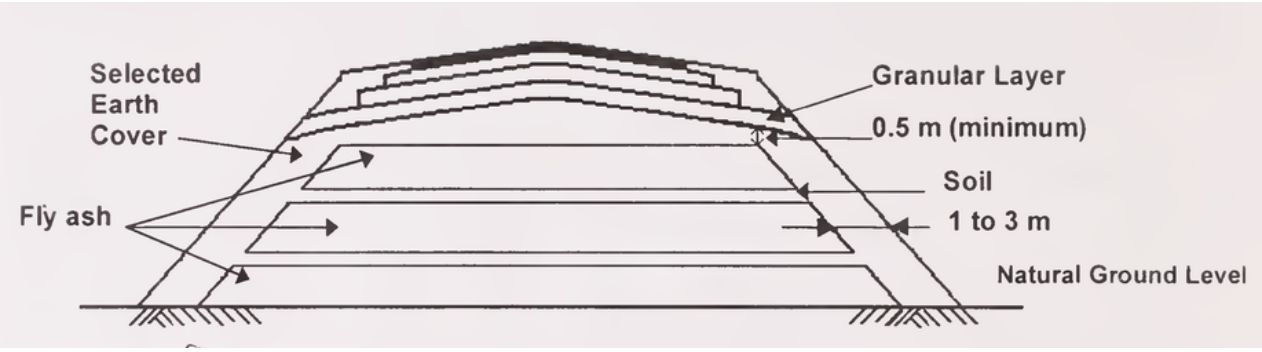
With the initiation of rapid urbanization and industrialization, there is an enormous demand for the power generation in India. The power generation is expected to rise to 300000 Megawatt (MW) by the end of 2022 and the depleting water resources are unable to meet the power generation demands. This has leaded to more and more coal combustion in the thermal power stations to meet the power generation demands. Fly ash is a residue obtained in the thermal power stations by burning pulverized coal and lignite. It has been disposed and dumped off in abundance at these power stations and serious concerns regarding its utilization and safe disposal need to be addressed.

Among the various uses of fly ash, its bulk utilization is possible in Geotechnical engineering applications. Fly ash is considered as “Polluting industrial waste”. Ministry of Environment and Forests (MOEF) and Ministry of Power (MOP) during the past several years are involved in proper planning for the utilization and disposal of Fly ash in India. In this experiment, fly ash is used as a filling material and geogrid is used as reinforcement. This paper is summarized with brief details of the properties of fly ash and geogrid strip used in embankments.

KEY WORDS: Fly ash, Backfill material, Geogrid, reinforcement, Industrial waste, Coal, Embankments

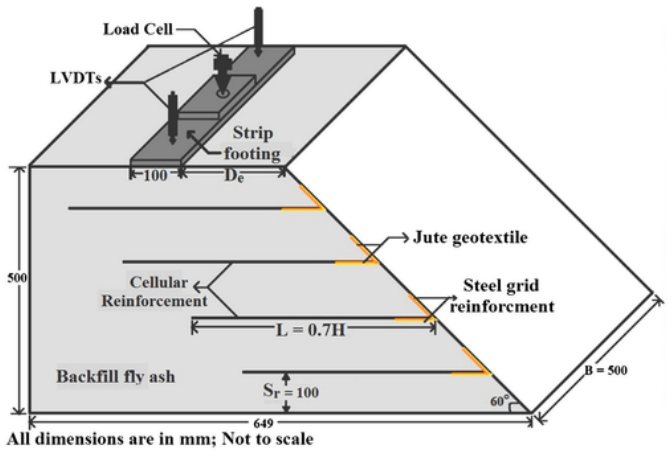
The research work focuses on using fly ash as alternative backfill material in reinforced slopes and using steel grid as a reinforcement in the form of planar mattress and strips and utilizing locally available used post-consumer plastic water bottles, another unwanted waste material usually disposed to the geo-environment in bulk quantity, were used to form the cellular mattress-strips reinforcements in slope backfill. This study also shows an easy way of recycling the waste plastic water bottles as geocells/cellular reinforcement in the field of geotechnical engineering. The concept of cellular reinforced fly ash slope was illustrated in the present study. For the environmentally conscious citizens and organizations, disposing off the non-biodegradable used plastic bottles has become a major concern. Approximately 600 billion bottles are discarded every year all around the world and only 47% is collected (Perpetual Global Ltd. 2013). Fly ash production annually in India is 131.09 million tons (2010-12) and total annual ash utilization is 73.13 million tons with percentage utilization of 55.79% [FLYASH Utilisation
(FAU) 2013].

In the absence of a well-planned strategy in India for the disposal of fly ash, it is posing serious health and ecological hazards (Kanojia et al. 2001). India, Bangladesh, and China are placed as first, second and third respectively in jute production (FAOSTAT, 2014), that means jute is easily and abundantly available in Asian zone.



An attempt has been made to understand the behaviour of steel grid and cellular reinforced fly ash slopes through different types of study methods, i.e., triaxial tests and laboratory model slope tests. Present research works also depicted the effective application of jute geotextile (functioned as reinforcement and separator) was also attached to the steel grid and cellular reinforcement layers from inner side basically at the slope side portion throughout the width to prevent escaping of fly ash and also for erosion control.

Literature provides sufficient insight to study the effect of planar reinforcement on triaxial loaded sample. Rajagopal et al. (1999), Latha and Murthy (2007) conducted several triaxial compression tests on granular soil encased in single and multiple geocells, whereas (Ram Rathan Lal and Mandal 2013, 2012) have performed unconsolidated undrained triaxial tests on unreinforced and fibre reinforced compacted fly ash. It can be observed from the literature that research is still needed to demonstrate the effect of steel grid reinforcement on the strength properties of fly ash reinforced samples (Nadaf and Mandal 2014) have performed unconsolidated undrained triaxial tests on unreinforced and steel grid reinforced compacted fly ash to evaluate the shear strength parameters.



Several experimental and numerical studies are available on behaviour of reinforced slopes with planar reinforcements using sand as fill material Mandal and Labhane (1992), Rowe and Mylleville (1993), Huang et al. (1994), Lee and Manjunath (2000), Yoo (2001); using granular material as backfill Mandal and Bhardwaj (2008), Choudhary et al. (2010), Gill et al. (2013). Few attempts have been made to know the behaviour of geocell/cellular reinforced slopes Krishnaswamy et al. (2000), Nadaf and Mandal 2017)

OBJECTIVES OF THE STUDY:

In continuation with the efforts for proper utilization of fly ash, the present study focuses on the direction of searching alternate backfill materials in cellular reinforced slopes and to make use of locally available waste plastic water bottles as cellular reinforcement. The following areas have been identified through the reviewed literature for the present study.

1. Development of a new three-dimensional cellular reinforcement made up of used and wasted plastic water bottles and its application in reinforced slopes.
2. To study the behavior of cellular reinforced slopes using different waste backfill materials subjected to two different types of loading conditions, strip and uniformly distributed loading using model tank studies
3. To carry out numerical simulation with finite element software Plaxis 3D and comparing the results with experimental results.

RESOURCE MANAGEMENT OF INFRASTRUCTURAL PROJECT FOR FUTURE CITIES: A RE MODIFIED MINIMUM MOMENT METHOD

-PALLAVI PATIL, KARTHIK NAGARAJAN , RAJU NARWADE

Infrastructural industry is facing a global challenge in optimisation from the past few decades in the field of resource management namely man, machine, material, money (4Ms). A well-designed sound scheduling technique for future cities other than normal traditional methods needs to be carried out to keep the country's economic growth well within its boundaries. Various past research experts have shown that the inter dependency of 4Ms and its varying consequences with the increase in duration directly affects the project cost.

To overcome this issue, the objective of this research emphasises in identifying a unique approach by real time monitoring of 4Ms and hence providing a optimize solution by a methodology termed as Re-Modified Minimum Moment Method (RMMM) with considering a case study from Mumbai region, stating post project analysis. Results signifies that RMMM gives better results in terms of optimization than traditional method. Resource improvement coefficient, Re modified minimum moment method, Resource levelling.

INTRODUCTION

Many project-based industries are recognizing the importance of project planning, but the Infrastructural industry depend on scheduling skills. As they are working under changing environmental conditions and being involved in some complex and a unique project, which requires multi-disciplinary collaboration for which they have to develop accurate planning and frequently modernizing in it. Nowadays there is increase in the competition within the industry which ultimately forces the construction companies to provide the products of good quality within limited durations, for lower costs and under the safe working conditions. In infrastructure project preparation, its schedule requires immediate changes in various uncertainties. Scheduling is not a simple concept of determining these quinces and the timings of activities within a project. A planner has to cope with a number of considerations and various constraints. Therefore, while planning a project site availability, lag durations, output rate, working schedule and atmospheric conditions are the measure issues which has to be analysed.

METHODOLOGY

Applying the RMMM method on data which is collected from site. In backward cycle to calculate the improvement factor, skip the activity having free float (FF) zero from CPM network. Select the activity having largest value of resource rate. There is possibility of having same value of R, at that time choose the activity having largest number of FF. If again there is tie, then activity which having largest duration is to be selected. If again there is tie, then choose the first activity in the queue. After calculating Improvement factor, the activity will be shifted to the new position if the calculated improvement factor of that activity will be larger than zero or equal to zero. Still the tie is observed in the value of IF, then the largest value of time unit is selected. No shifting of activity takes place if the value of Improvement factor is negative. If shifting occurs, the resource rate of activity is subtracted from daily resource sum hence the FF, lags, EFD and ESD are updated in the network. Repeating the process for all the activities which can be shifted and hence the backward cycle completes. Again, the process is staring with forward cycle. At the end, when the process gets finished, we will get final outcome.

3.1 Re Modified Minimum Moment Method

In the sequential step of network to select the criteria of activity, Re modification of minimum moment method is considered. The assumptions are made in the RMMM are same like MM and MMM. Improvement Factor (activity J, S) = R (∑x - ∑w -mR) Where, IF = Improvement factor, S = Count of shifting days, ∑x = Daily resources sum of x1, x2, . . , xm, to which deduction of m daily resource rates (R) is to be apply. ∑w = Daily resources sum of w1, w2, . . ,wm, to which addition of m daily resource rates (R) is to be apply; m = Least of either activity duration (t) or the activity is to be shifted (S) in days; R = Resources rate. To get resource improvement factor, minimum moment of the element exists when the histogram is shaped as a rectangle over this interval. This moment is the minimum possible for any resource histogram regardless of the total amount of the resource. [9] RIC = n*∑Yi 2/(∑Yi) 2 Where ∑Yi= Sum of daily resource sum at I th day Ideally, the value of this coefficient would be one; hence, the nearer the value of the RIC is to one, the more closely the resource histogram is to a rectangle.

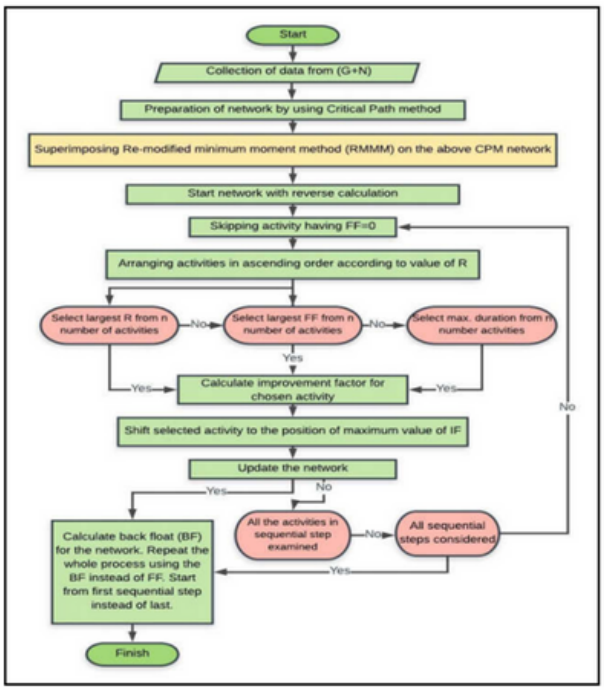


Fig.1 Flowchart on Re modified Minimum Moment Method

3.2 Study area of the project

Study area located in Fig 2 is having coordinates of proposed site are 19.2813° N, 73.0483°

3.2.1 Data collection and Analysis

The data is collected from Residential Construction project at Bhivandi. The activities are arranged according to their inter relationship which are shown in table 1. The proposed Construction project involves the following activities. Table No. 1 contains the activity No., task name and duration. By using these three inputs, a well-arranged CPM network is prepared. According to CPM network, free floats are calculated and critical path is decided. Activity No. 14 is selected to show sample calculation of improvement factor, in which fig. 3 shows the schematic representation of activity no. 14 and fig. 4 shows the bar chart of activity no. 14, in which the FF is 2 therefore activity can be shifted by 2 days

Table 1: Activities involved in the project

Activity No.	Task Name	Duration
1	Excavation	14
2	Foundation For PCC	6
3	RCC Footing	37
4	Columns Up To Plinth	3
5	Plinth And Ground Beams	4
6	Murum Filling	11
7	Soiling	1
8	PCC Below Flooring	11
9	Columns Up To First Floor Slab	7
10	First Floor Slab	10
11	Ground Floor Brickwork	14
12	Ground Floor Neeru Plaster	16
13	Columns up To Second Slab	7
14	Second Floor Slab	5
15	First Floor Brickwork	14
16	First Floor Neeru Plaster	16
17	Ground Floor Flooring	7
18	Doors & Windows	16
19	First Floor Flooring	7
20	External Sand Faced Plaster	9
21	Painting	12
22	Site Cleaning	14

AON network is drawn for the activities arranged according to their EST, remodified minimum moment method in figure 3 and 4.

CALCULATION

To obtain the minimum moment, improvement factor is needed and for that calculation of each activity is done. Activity no. 14 is explained from all the activities of
construction project.
Consider activityno.14
Improvement Factor (activity J, S) = R (∑x - ∑w –mR)
R14=6; F.F.14=4; D14=5
I.F (14, 1) = 11 – 5 – (6*1) =0
I.F (14, 2) = (11*2) – (5*2) – (6*2) =0
I.F (14, 3) = (11*3) – (5*2) – 7 – (6*3) = –2
I.F (14, 4) = (11*4) – (5*2) – (7*2) – (6*4) = –4
Shifting activity 14th by 2 days.
Where, R = resources used for that activity
d = Duration,
f.f. = free float,
i.f. = improvement factor

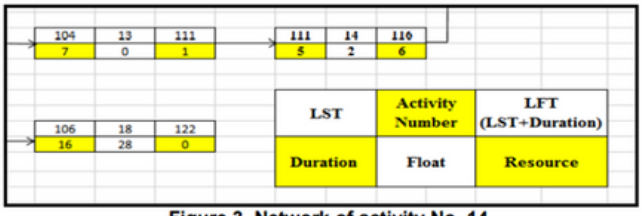


Figure 3. Network of activity No. 14

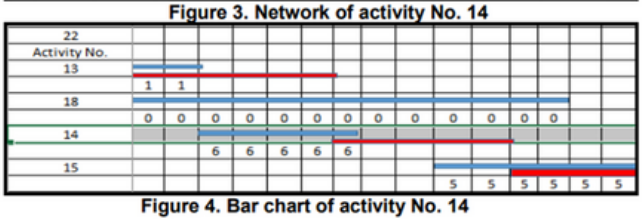


Figure 4. Bar chart of activity No. 14

RESULT AND DISCUSSION

Re-modified minimum moment method is helpful to complete the work without any interruption. This can be achieved through proper scheduling of construction activities. Re-modified minimum moment method is helpful to minimize calculation and maximize output in terms of accuracy. 1. The RIC of the project by EST is 2.07 and by Re-modified minimum moment method is 1.93. 2. By using above methodology, the duration of each activity remains constant. 3. By using above concept, the network logic is fixed. 4. By using above concept less calculation is expected with maximum accuracy. 5. According to histograms, Re-modified Minimum Moment Method gives the uniform resource management than EST which is shown in figure 5 and figure 6.

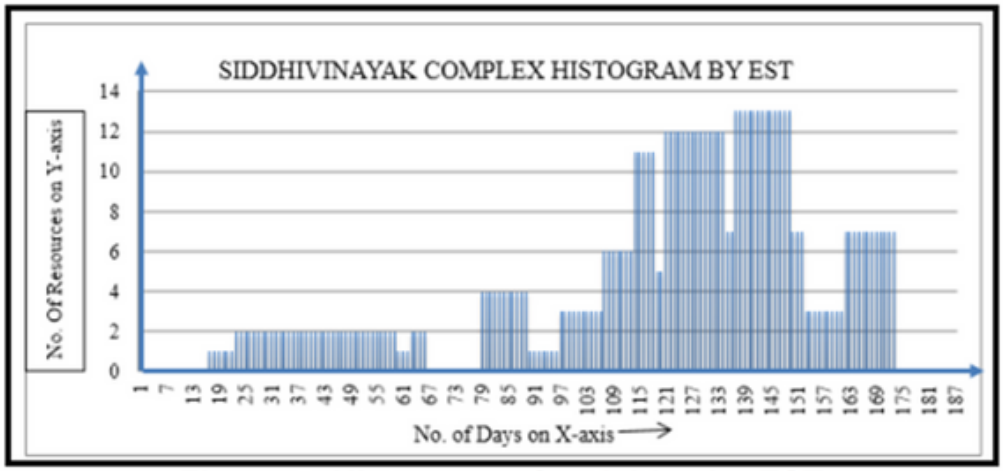


Figure 5. Histogram of activities by EST

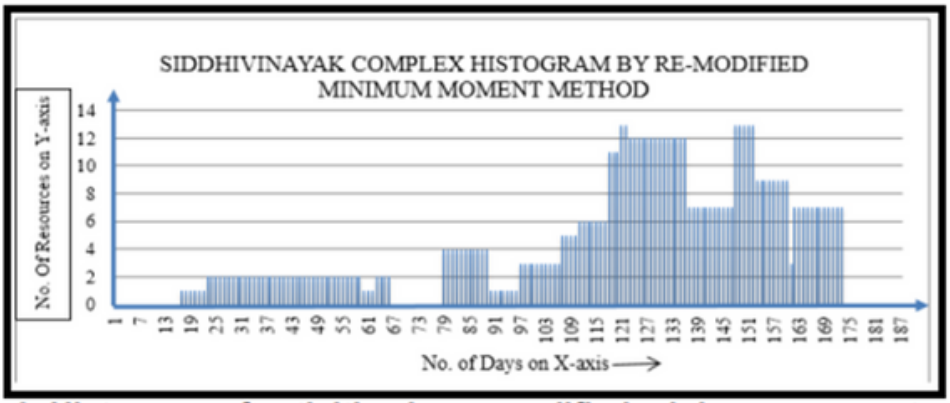
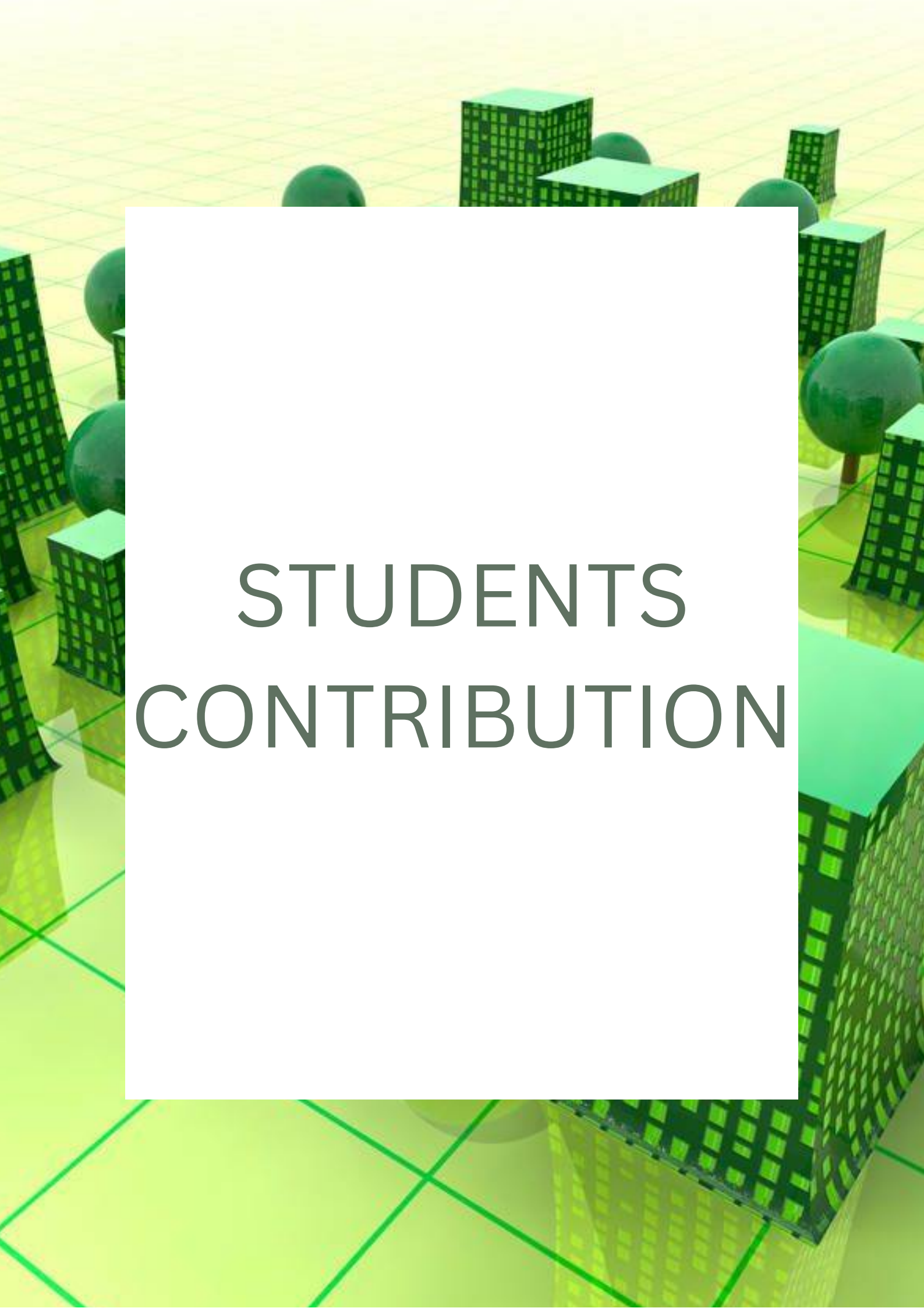


Figure 6. Histogram of activities by re-modified minimum moment method



STUDENTS CONTRIBUTION

TIMELINE

01

TECHNICAL DESIGN PROPOSAL SUSTAINABLE SOLUTIONS COMPETITION

02

COMPARATIVE ANALYSIS OF STRUCTURE FOR CALAMITY BY USING MIDAS GEN AND ETABS

03

GREEN BUILDING MATERIALS – A WAY TOWARDS SUSTAINABLE CONSTRUCTION

04

DEVELOPMENT OF WASTE CLOTH MODIFIED BITUMINOUS -MODIFIED ROAD CONSTRUCTION

TIMELINE

05

NICKEL AND NICKELALLOYS

06

GRADUALLY VARIED FLOW

TECHNICAL DESIGN PROPOSAL SUSTAINABLE SOLUTIONS

-LEANDER CARVALHO, HARSHAD SAWAKHANDE, NIMISH VARDAM, NARESH SAINI KISHAN KUMBHAR

Our approach towards the design consisted of four main processes: research, discussion, revision, and accumulation of all the information that was available to us. All the data was then clustered and was laid out respectively. All the members of the team are third-year engineering students from Thakur College of Engineering and Technology, Mumbai. We were provided with a plot of 1.07acres in area and were asked to design it with the perspective of sustainability ensuring comfortable and healthy living. 10 tiny houses, each of 400 square feet are designed by ensuring that these apartments are the residences for temporary job seekers.For achieving sustainability, adapting to our changing climate, ensuring resilience to events such as flooding, earthquakes, or fires so that our buildings stand the test of time and keep people and their belongings safe. Designing flexible and dynamic spaces, anticipating changes in their use over time, and avoiding the need to demolish, rebuild or significantly renovate buildings to prevent them from becoming obsolete.

We were focused to use low-carbon concrete mixes, even though emissions per ton are not relatively high, its weight and prevalence usually make concrete the biggest source of embodied carbon in virtually any project. We have designed lower carbon concrete mixes by using fly ash, slag, calcined clays, or even lower-strength concrete where feasible. We limited the use of carbon-intensive materials, products with high carbon footprints like aluminum, plastics, and foam insulation, but it is important to use them judiciously because of their significant carbon footprint. We have limited use of finish materials which will further reduce carbon emission. The site has also been planned to utilize maximum of renewable resources such as rainwater achieved by building rainwater harvesting tank which would cater to some of the needs of the members of the residence, also the solar panels would cater to some of the energy demands of residence, both providing net impact on less requirement of energies from another source.

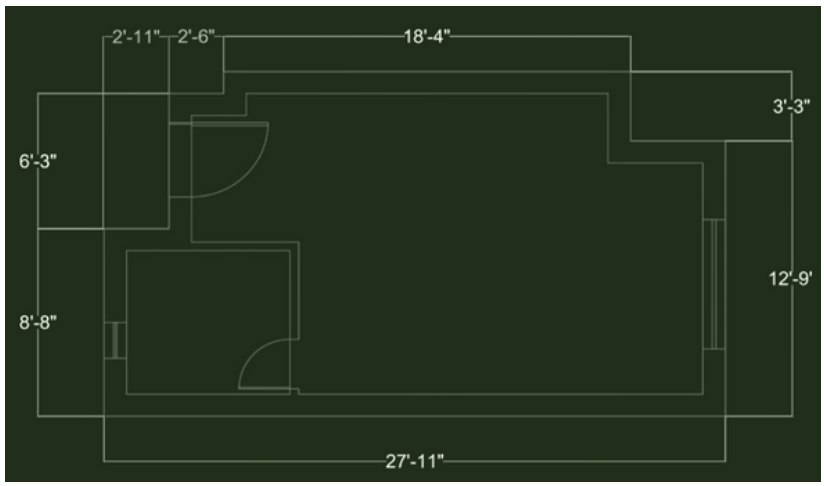
ASCE Student Chapter Thakur College of Engineering & Technology

We aim at achieving sustainable and net-zero sustainable housing suitable for the hot and humid climate of Maharashtra. We plan to produce housing that collectively commits to sustainability. CONCEPT NARRATIVE (HEALTH, WELLBEING, AND COMMUNICATION) Goal: Creating a new framework for human experience Human behavior is the next frontier of energy efficiency in sustainable housing. Design that empowers occupants to measure and manage their energy consumption can have a significant impact on overall building energy use. The symbiosis between timeless passive strategies, high performance, engagement, and responsibility towards a sustainable energy balance. This will encourage residents in reducing energy and resource demand and creating positive social connection opportunities. Human contributions plus high-performance building strategies, help to create a reduction in Energy Use Intensity(EUI) over baseline standards.

DESIGN CALCULATIONS

Tiny Houses

The total plot area = 1.07acres (46640sq.ft.) Area of each dwelling unit (Tiny house) = 400sq. ft. Width of Entrance and the exit driveway = 24ft. (7.3m) Total area occupied by the tiny house = 400*10 = 4000sq.ft



The above image displays the plan of the tiny houses on our site. Our site consists of ten RK plans with attached w/c. Each unit has an area of approx. 405 sq. ft. The carpet area for the dwelling unit is approximately 320sq. ft. Where the area for the Room is 271 sq. ft. and for the water closet is 49 sq. ft. respectively.

STORMWATER MANAGEMENT

Rainfall Intensity = 0.5"/hr. (90-inch annual rainfall) Total no of residents on site = 30

Water Consumption (lcpd)	
Purpose	**Consumption(lcpd)**
Bathing	30
Flush	15
Drinking	5
Washing Clothes	20
Cooking	2
Washing Utensils	3
Total	**75**

The average water consumption for our project is 75lcpd Water requirement = 30 x 75 = 2250 liters/day= 2250 x 360 = 8,10,000 liters/year Rainwater harvested by rooftop catchment = 8,48,992.155 liters/year

Strom water runoff

Total drain length = 968 ft Area = 3868sq.ft Peak runoff volume = 12700.06 liters / 449cu.ft Peak runoff rate = 105.992 liters / 0.66cu/sec Per house 3 ppl, water requirement per house will be 3 x 75 = 225 liters. The tank size per house will be 500 liters. This tank would be provided in the water closets as an overhead tank inside the dwelling units.

WASTE GENERATION CALCULATIONS

This table shows that waste generated by an individual is assumed to be 450gms And the maximum number of people accommodating in our site is assumed to be 30. Total Waste Generated = 450*30 = 13500gms or 13.5kg Total Waste Generated Annually = 13.5*365 = 4927.5kg

Segregation of waste			
Food	14.60%	719.415	Kg
Wood	6.20%	305.505	Kg
Rubber, Leather & textiles	9%	443.475	Kg
Plastics	12.80%	630.72	Kg
Metals	9.10%	448.4025	Kg
Glass	4.50%	221.7375	Kg
Paper	27%	1330.425	Kg
Others	3%	147.825	Kg

This table shows, how the waste has been segregated in different sections.

Sewage Waste generated		
Waste Generated by Per Capita	5.43	Lpd
Total No of people in building	30	Nos
Total Waste Generated per day	162.9	Grams
Total Waste Generated Per year	59458.5	Liters

This table shows that the average waster generated per capita is assumed to be 5.43lpd.

The Total Waste generated per day = **5.43*30 = 162.9 lit/day.**

Total Waste generated annually = **59458.5 lit/year**

Energy Generation and its Consumption

Energy consumed by the Digestor and Shredder (Anaerobic Digestion Process) On average, the total power required for this process is 29.5 kW/day. So annually, the total energy consumed for this process is 29.5*365 = 10,767.5 kW/year. 2. Energy consumed by fans and lights. Considering 2 fans per unit with a power rating of 48 watt/hour for fans (Avg. Runtime – 8hrs). 3 LED light bulbs of power rating 12 watt/hour and 1 LED tube light of 18 watt/hour rating each (Avg. Runtime – 6hrs). Hence, the power consumed by fans alone for each unit is 0.768 kW/day. The power consumed by lights alone for each unit is 0.324 kw/day The total power required for 10 units = (0.768 + 0.324) *10 = 10.92 kW/day. So annually, the power consumption for all the UNITS would be 10.92*365 = 3,985.8 kW/year. 3. Other lights and Amenities. (Sidewalk lights, pumps, refrigerators, washing machines, etc) Average power consumption can be for such equipment's considered as 30 kW/day. So annually the energy required would be 30*365 = 10950 kW/year.

B)Energy Generation

Energy Generation by Solar Panels (8 hours). The solar panels are oriented in such a manner that they face the southern direction for optimum results. The energy that can be generated with the help of Solar panels is considered to be 400 Watt/hr which are operational for about 8 hours a day. Therefore, the energy produced by a single solar panel = 400*8*0.8 = 2.56 kW/day The roof area for design is about 409 sq. ft., and the size of the solar panel under our consideration is 77 x 39 inches (20.85 sq. ft.). Hence, for the total of 409 sq. ft. we have accommodated 3 solar panels on the roof. So, the energy generated by all the solar panels (30) would be 30*3 = 76.8 kW/day. The total energy generated by the solar panels annually is = 76.8*365 = 28032 kW/year Therefore, the average total energy generated can be considered as 28000 kW/year.

Data Required for Design of Septic tank & Soak pit		
No. of building	10	Nos
No. of Person in Building	3	Nos
Supply Quantity	135	Lpcd
Detension Period	24	Hours
Cleaning Period	1	year
Sludge Deposit	40	Lit/Per/Year
Minimum Freeboard	300	mm
Sewage Generation	85% of water supply	
Height of tank	1.5	Meter
L= 4B		

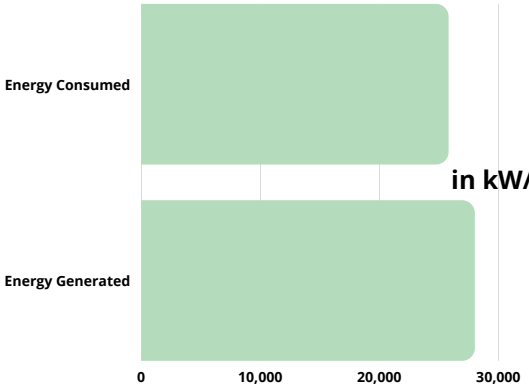
This table indicates that, what all parameters were assumed during the designing of septic tank and soak pit including the quantity of all parameters.

Septic Tank Calculation		
Waste coming from building to Septic Tank	3442.5	Liters/ Day
Detension Period	24	hours
Tank capacity required	3442.5	Liters
Capacity required for sludge accumulation	1200	Liters/ Year
Total Volume Required	4642.5	Liters
Area of tank	3.095	Sqm
Length of tank	3.518522	Meter
Breadth of tank	0.879631	Meter
Height of tank	1.5	Meter

This Table shows that, keeping in mind the previously calculated parameters, we were able to design Septic Tank which was within the safety limits. The dimensions of the Septic tank are also highlighted.

Soakpit Calculation		
Waste coming from Septic Tank	3442.5	Liters/ Day
Percolation Rate	1500	Lit/m3/day
Volume of filter media	2.295	m3
Assume depth of pit	2	Meter
Area of soak pit	1.1475	Sqm
Diameter of Soak well required	1.209042	Sqm
Depth of Soak Pit	2	Meter
Diameter of Soak well	1.209042	Meter

The adjoining table indicates that We have acknowledged the above-calculated parameters and have come up with a design for the Soak Pit. The dimensions of the Soak pit are calculated at the end of the table.



Total Energy Consumed v/s Total Energy Generated

in kW/year

COST ESTIMATION
SITE AREA= 4330.136 SQ.M BUILT-UP AREA = 35 SQ.M Ground Coverage (Plinth Area)= 1732.054 SQ.M

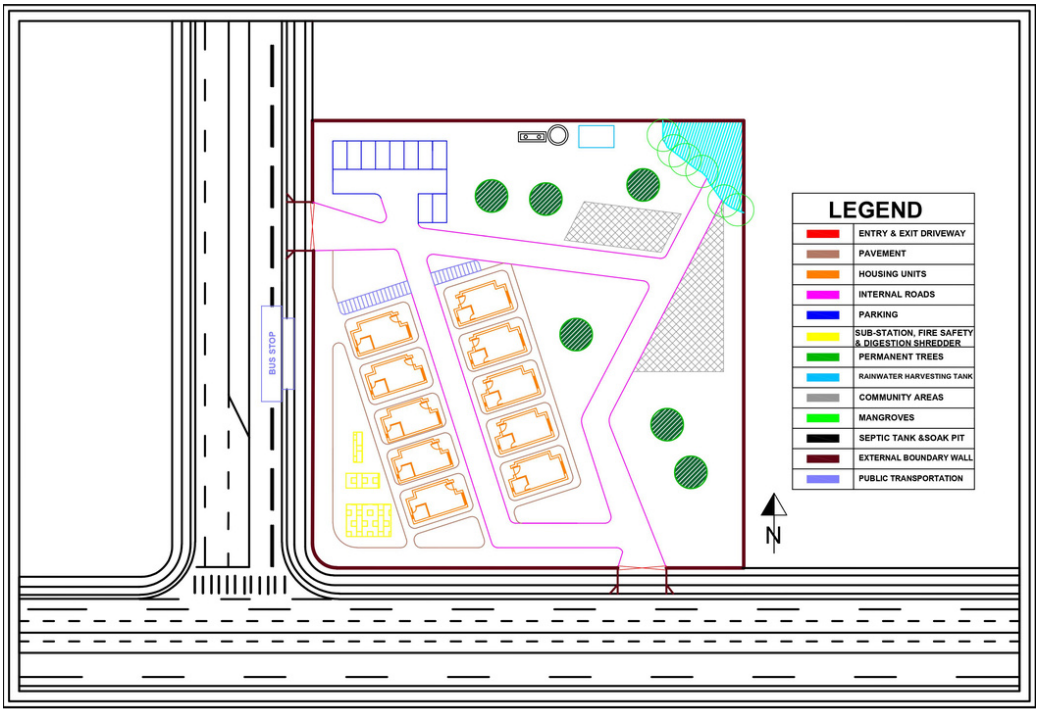
No.	Item Description	Unit	Baseline Estimate		
			Quantity	Rate (Rs)	Amount (Rs. Millions)
A. CIVIL WORKS					
1	**EXCAVATION**				
1.1	Excavation In Soil	Cu.m	383.04	182	69713.28
1.2	Antitermite treatment	Sq.m	191.52	2145	410810.40
	"Insert Row" to add more items				
2	**RCC WORK**				
2.1	PCC Plinth M10	Cu.m	28.7	7530	216321.84
2.2	RCC(M35 grade)	Cu.m	49.6	7193	356754.82
2.3	Cement Bags	Sq.m	1480.0	450	666000.00
2.4	Reinforcement ,TMT Fe 500	M.Ton	3.2	42600	137335.4775
	"Insert Row" to add more items				
3	**SHUTTERING WORK**				
3.1	Shuttering Area	Sq.m	70	450	31689.00
	"Insert Row" to add more items				
5	**FAÇADE WORK**				
5.1	230 mm Thick Brick Wall	Sqm	1094.4	160	175104.00
	External Plaster	Sqm	1205.6	215	259204.00
	"Insert Row" to add more items				
	SUB- TOTAL (A)				**18,42,409.14**
B. INTERNAL WORKS					
6	**INTERNAL WALLS , FINISHES**				
6.1	120 mm Thick Brick Wall	Sqm	132.0	160	21120.00
6.2	Internal Plaster - Walls	Sqm	2515.3	190	477903.20
6.3	Painting of Internal Wall +Ceiling	Sqm	2515.3	241	606182.48
	"Insert Row" to add more items				
7	**WATERPROOFING**				
7.1	Toilet	Sqm	204.2	385	78601.60
	"Insert Row" to add more items				
8	**TILING WORK**				
8.1	Flooring - Ceramic	Sqm	204.4	440	89936.00
	Ceramic 12 x 12 Toilets	Sqm	40.0	0	0.00
	Dado - Toilet	Sqm	164.6	350	57624.00
	"Insert Row" to add more items				
9	**DOORS**				
9.1	D1(Entrance door for room)- 1.0 *2.1	Sqm	21.0	5161	108381.00
9.2	D2(Door for Toilet)- 0.7*2.1	Sqm	29.4	2230	65562.00
	"Insert Row" to add more items				
	SUB-TOTAL (B)				**15,05,310.28**
C. MEP SERVICES					
11	**HVAC**				
	Ventilation Fans	Nos	10	1530	15300.00
	"Insert Row" to add more items				
12	**ELECTRICAL & ALLIED SERVICES**				
12.1	Substation (Including Transformers)	Nos	1	800000	800000.00
12.2	Panels / Distribution Boards & Switch Gears – Main Panels / Distribution Boards & Switchgears – Sub Distribution	Nos	10	750	7500.00
12.3	Cabling	Rm	87	141	12267.00
12.4	Light Fittings	Nos	60	130	7800.00
12.5	Internal Wiring	Rm	187	750	140250.00
12.6	Earthing & Lightning Protection	Rm	10	3200	32000.00
12.7	D.G. Sets 4000 KVA	Nos	1	120000	120000.00
	"Insert Row" to add more items				

13	**PLUMBING & SANITATION**				
13.1	Internal Drainage				
13.1.1	Pipe (1 inch)	Rm	43	120	5160.00
13.1.2	Pipe (2 Inch)	Rm	24	210	5040.00
13.1.3	Nahani Trap	Nos	10	135	1350.00
13.1.4	P- Trap	Nos	10	400	4000.00
13.2	External Drainage				
13.2.1	Soil pipe (100mm)	Rm	37	2945	108965.00
13.2.2	Waste pipe: Horizontal (50 mm)	Rm	22	100	2200.00
13.2.3	Waste pipe: Vertical (75 mm)	Rm	14	125	1750.00
13.2.4	Rain Water pipe (75 mm)	Rm	60	125	7500.00
13.2.5	Septic Tank	Cum	1		0.00
13.2.6	Inspetion Chamber	Nos	14	2200	30800.00
13.3	STP and ETP				
13.3.1	Automatic Shredder Machine	Kg/hr	1	195000	195000.00
13.3.2	Anaerobic Digester	KLD	1	550000	550000.00
13.3.3	Automatic wet waste composter	Kg/day	1	200000	200000.00
13.4	Water Treatment and Distribution		1	280000	280000.00
13.5	Domestic & Flushing water lift pumps, tank, panels				
13.5.1	Water Pump OHT (Portable Water)	KL	1	15460	15460.00
13.5.2	Water Pump OHT (Non-Portable Water)	KL	1	15460	15460.00
13.5.3	Water Pump OHT (Treated Waste Water)	KL	1	5329	5329.00
13.6	Tanks				
13.6.1	Over Head Tank	Liters	10	59000	590000.00
13.6.2	Underground Water Tank	Liters	1	135000	135000.00
13.7	Rainwater Storage system	Liters	1	120000	120000.00
	"Insert Row" to add more items				
14	**FIRE FIGHTING**				
14.1	Sprinkler System	Nos	30	170	5100.00
14.2	Fire Extinguishers	Nos	22	1780	39160.00
14.3	Buckets	Nos	12	290	3480.00
	"Insert Row" to add more items				
15	**IBMS AND SECURITY SYSTEM**				
15.1	Fire Alarm System	Nos	12	4560	54720.00
15.2	Access Control System	Nos	10	25000	250000.00
15.3	CCTV System	Nos	18	20338	366084.00
15.4	Waterleak detection system	Nos	12	10500	126000.00
	"Insert Row" to add more items				
	SUB-TOTAL (C)				**42,52,675.00**
E. CAR PARKING & CHARGING STATIONS					
18	**CAR PARKING**				
18.1	Pavered Blocks for Members parking	Sq.m	210	1100	231000.00
18.2	Pavered Blocks for Visitors parking	Sq.m	126	1100	138600.00
19	**Electric Vehices Charging station**				
19.1	Charging Point	Nos	1	140000	140000.00
	"Insert Row" to add more items				
	SUB-TOTAL (E)				**47,62,275.00**

F. LANDSCAPE & SITE DEVELOPMENT					
20	**SITE DEVELOPMENT**				
20.1	Roadways	Rm	84	11000	924000.00
20.2	Walkways	Rm	88	2800	246400.00
21	**LANDSCAPING**				
21.1	Landscaping and Hardscape	Sq.m	3471.14	2200	7636499.20
	"Insert Row" to add more items				
	SUB-TOTAL (F)				**88,06,899.20**

GRAND TOTAL= 2,11,69,568.62

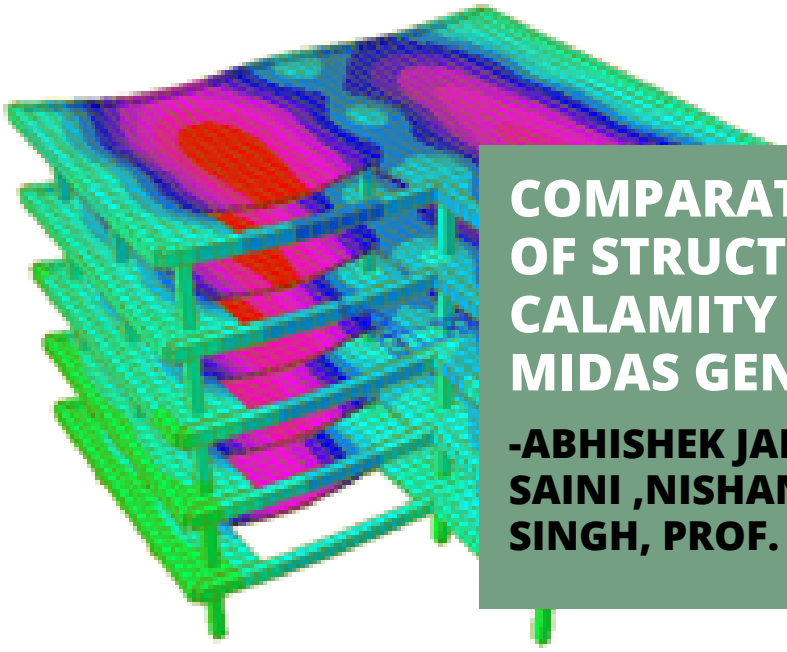
Two Crore eleven lakhs sixty-nine thousand five hundred sixty-eight and sixty-two paise only.



ENVISION JUSTIFICATION

The checklist presents the Envision criteria as yes/no questions, helping project teams to quickly identify whether they are addressing the full range of sustainability criteria. Envision is a framework that includes 64 sustainability and resilience indicators, called 'credits', organized into five categories:

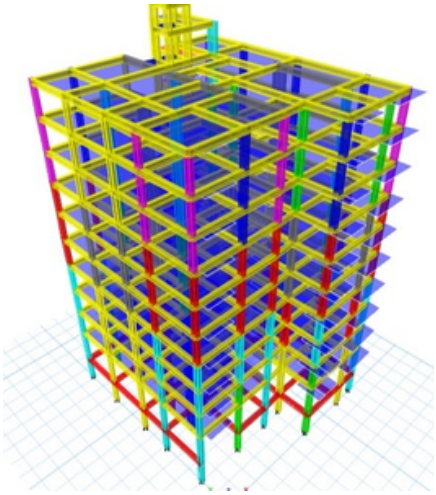
- QUALITY OF LIFE
- LEADERSHIP
- Resource Allocation
- NATURAL WORLD
- Climate & Resilience



COMPARATIVE ANALYSIS OF STRUCTURE FOR CALAMITY BY USING MIDAS GEN AND ETABS

-ABHISHEK JAISWAL ,NARESH SAINI ,NISHANT SHARMA, SUMEET SINGH, PROF. NINAD KHANDARE

Abstract: -Earthquakes have lead to lot of damage to life and property which has affected socio economic condition of the people as well as the country. To overcome these damages there is a need to develop new advancements in construction technologies. Nowadays construction of high-rise building is increasing. The concept of high-rise building was introduced back to accommodate more people. With the upcoming years and booming population its high time to develop more in the field of sky scrapper. As we talk about development, we face problems of sustaining current towers from seismic behaviour.

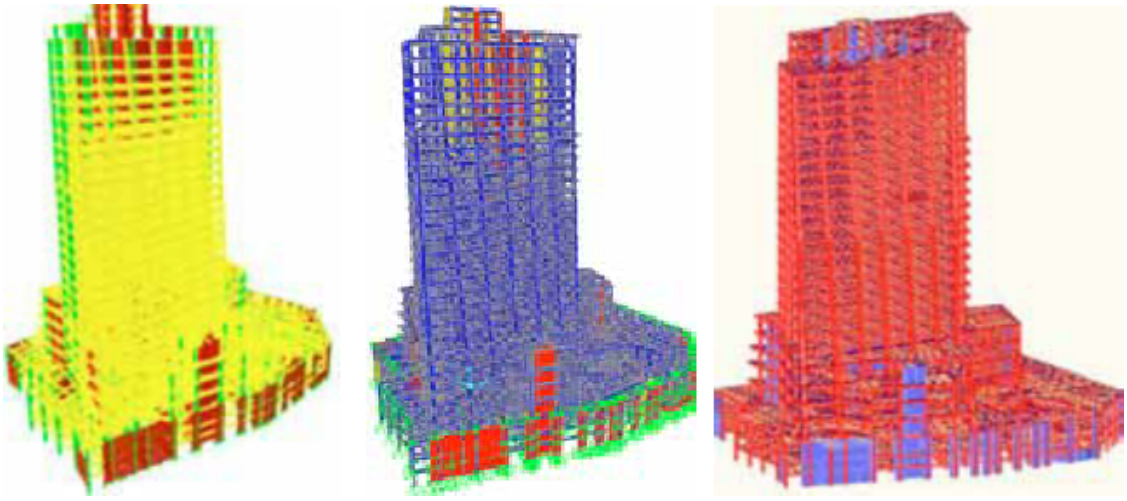


Our research is based on analysis of various methods available and which is better studying its classification and its use. As far as development we need to boost these techniques more in India and also need to understand which works best for our environmental conditions. In conjunction with the design philosophy, it is essential to adopt earthquake-safe construction practices for the efficient seismic performance of a building. Regulating its design procedures and its modern technologies. The major techniques which we will be using are base isolation, shear wall and bracing We took the case for Seismic zone 2 with medium soil category. The analysis is performed using software like MIDAS GEN, ETABS. Due to requirements of lateral strength and stiffness, as well as the deformation under high wind and earthquakes, along with compounding gravity and construction issues, economic construction of high-rise buildings is a challenge.

Keywords— Seismic behaviour and design, high-rise building, Auto-CAD, ETABS, MIDAS GEN, Shear walls, Bracing, base isolation

INTRODUCTION

From a structural point of view, lateral forces resulting from earthquake and wind loads play a major role in the design process. High-rise buildings' construction is one of the most challenging engineering projects and the design completely depends on analytical and scale modelling. The economic viability of tall buildings depends strongly on serviceability and occupant comfort, among other factors. Tall buildings generally have issues due to environmental loads brought by, for instance, hurricanes and earthquakes, which can decrease the serviceability and may even lead to catastrophic failure, such loads and associated responses are not properly accommodated. Tall buildings designed to resist wind loads are considered to be safe under small and moderate earthquakes, however, their design in seismically active regions can be varied drastically from region to region depending on the local seismicity. The typical approach used to mitigate undesirable behaviour of these buildings is to alter the dynamic characteristics under excitation loads, which further leads to systematically tuning structural properties or structural control. subject of intense investigation and study. Earthquake explanations two types of losses often called primary loss and secondary loss. A main loss irrecoverable loss, which results in the human lifestyles in earthquake. All of the different termed as secondary losses. Thus, minimum common in a code to resist earthquake is prescribed such that whole crumple of structure is prevented which ensures that no human lifestyles are lost. This requires a forecast of the strongest depth of probably ground movement at a distinct site throughout the service lifetime of constitution. Seismic zoning map of a nation segregates nation in quite a lot of areas of an identical probable highest intensity of ground motion. These hazards have proved to be the most difficult enemy of mankind as they are able to cause destruction on a large scale close to human settlements. The study of human history indicates that the ability of natural hazards to cause destruction is partly due to lack of preparedness of human beings to mitigate the effects of these hazards. In the field of civil engineering the problem that we face is to make sustainable structures that withstand natural calamities and have least damage of any kind. And in this research, we are going to talk about how to handle seismic problems. The lack of earthquake knowledge and its incorporation in the building design and execution leads to failure of buildings.



1.PRE-STRESSED CONCRETE

Members in earthquake-resistant construction this ensures proper connection between various components of a structure. Further, this technology has been widely adopted in New Zealand.

2.SHAPED-MEMORY ALLOYS

Exhibit unique characteristics are desirable in an earthquake resistant building. They have the ability to dissipate significant energy without significant degradation or permanent deformation. The most common shape memory alloys are made of metal mixtures containing copper zinc aluminum nickel, copper-aluminum-nickel or nickel titanium. This specific smart material is being widely researched to explore its extensive applications

3.BASE ISOLATION

It's one of the widely accepted and adopted approaches for protecting the building from seismic forces. It is a collection of structural elements responsible for decoupling superstructure from the substructure. When the ground supporting the foundation of the building shakes, this component undergoes lateral displacement while keeping the structure intact.

4.SEISMIC DAMPERS

These dampers act like the hydraulic shock absorbers in cars – much of the sudden jerks are absorbed in the hydraulic fluids and only little is transmitted above to the chassis of the car. When seismic energy is transmitted through them, dampers absorb part of it and reduce the magnitude of the force. Types of seismic dampers include viscous dampers (energy is absorbed by silicone-based fluid passing between piston cylinder arrangement), friction dampers (energy is absorbed by surfaces with friction between them rubbing against each other), and yielding dampers (energy is absorbed by metallic components that yield). he magnitude of the force acting on a structure.

5.SHEAR WALLS

Shear walls are considered as an essential component of a lateral load resisting systems and steel is well known for its ductile behaviour. Combining these two desirable properties, an effective load resisting system was developed and has found wide applications in Japan and North America. These walls are designed in such a way that they bend instead of buckling under the action of lateral loads. These walls are significantly thinner and lighter, thereby reducing the building weight. Further, these walls need not be cured and hence, speeding up the construction process.

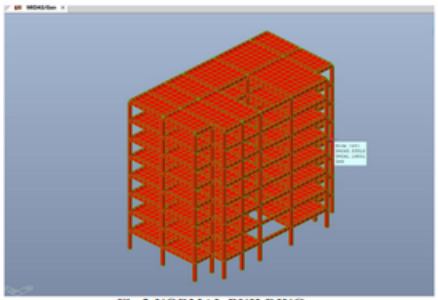


Fig.2-NORMAL BUILDING

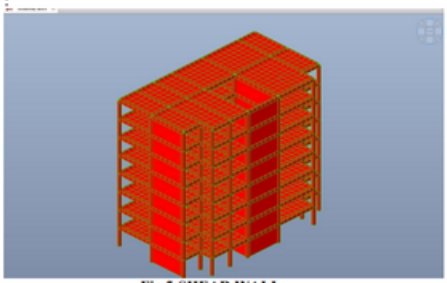


Fig.5-SHEAR WALL

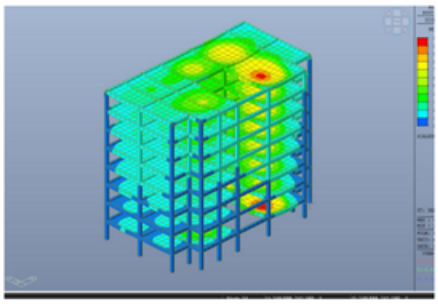


Fig.3-DISPLACEMENT COUNTOUR

DISPLACEMENT DIAGRAM:

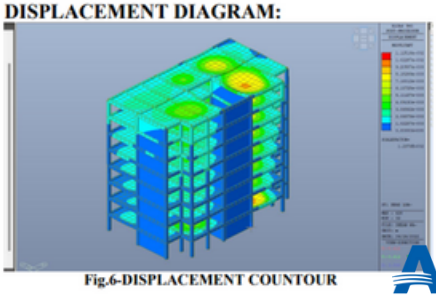


Fig.6-DISPLACEMENT COUNTOUR

BUILDING DETAILS

No. of Storey	8
Grade of Concrete (Beam & column)	M40
Grade of Concrete (Slab)	M30
Grade of Steel	Fe415
Column	(EC) 450mmx450mm (IC) 350mmx300mm
Beam	500mmx350mm
Slab Thickness	150mm
Wall Thickness	200mm
Storey Height	3m
Type of Soil	II- Medium soil
Seismic Zone	Zone - II
Zone Factor	0.16
Importance Factor	1.0
Response Reduction Factor	3.0
Type of Soil	B – Medium Soil

V. CONCLUSION

According to the study and the analysis carried out in this paper, we can say that the tasks of providing full seismic safety for the residents inhabiting the most earthquake-prone regions are far from being solved. Earthquakes are very serious problems since they affect human life in various ways. The Earthquakes are prevented by methods namely Base Isolation Methods Seismic Dampers, Bracing, etc. There are structural requirements which a building should have in order to resist earthquakes. There are various designs of structures which cause damages during earthquake and the most important one is the “short column effect”. The various solutions which can be applied in order to overcome these effects and to strengthen the structural element. The retrofitting and special confinement reinforcement is the methods applied.

ANALYSIS RESULT:

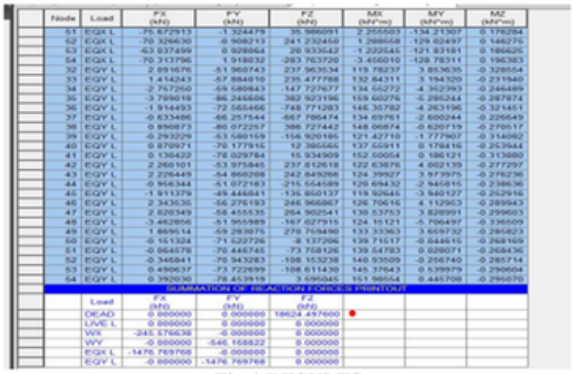


Fig.4-RESULTS

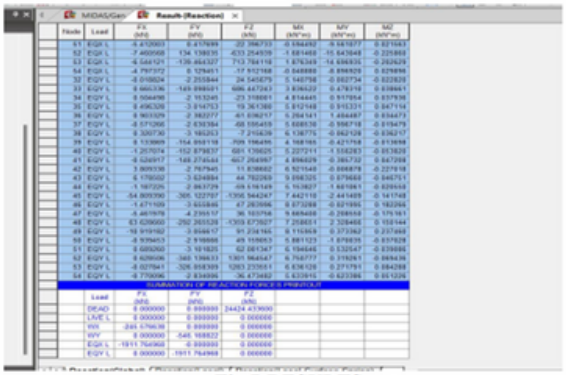


Fig.7-RESULTS

ETABS:

CASE 1: Normal Building

This paper explains the methods and their preventive measures about Earthquakes. The present paper deals with structures which resist Earthquakes. It explains the frames which help in resisting Earthquakes. Researchers all over the world are attempting to produce cost-effective and efficient construction technology by making use of locally available materials. The behaviour of high-rise structure is studied in this paper. And the results showed how using different methods can help resist seismic and wind-based problems in high-rise structures. This needs to be implemented faster and more with regions facing huge seismic and wind resistive issues and further throughout the country. We understood that the need of new technologies is necessary and these techniques helps us lessen the damage due to earthquake.

GREEN BUILDING MATERIALS – A WAY TOWARDS SUSTAINABLE CONSTRUCTION

-SHREYA WAYKAR
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SIDDHESH PAWAR(MENTOR)

The continual rise in global warming and the increase in natural disasters always gives us hints that we should be striving toward sustainability in every field conceivable. Also, with the increased global energy use and the inevitable depletion of fossil resources, we must ensure that energy security is ensured when traditional energy sources run out. The construction industry, which has a significant environmental impact, must adapt to more environmentally friendly construction. Thus non-toxic, natural, and organic substances in green building materials have the potential to lessen their overall impacts on the environment and human health. As a result, this research paper discusses a few green building materials that, when used instead of concrete, can be more effective and environmentally friendly, allowing us to enjoy more green places. Keywords—Sustainable development, green building materials, life cycle assessment, human health, environment friendly. Keywords—Sustainable development, green building materials, life cycle assessment, human health, environment friendly

Most of the spaces will be covered by concrete due to urbanization to meet housing requirements of the rising population. There will be fewer green spaces to enjoy in the city and around the world in the near future, with harsher weather due to rising global warming. Concrete is one of the most essential building materials, not only in terms of quantity but also in terms of environmental impact. Cement manufacturing is responsible for 5–8% of global carbon dioxide emissions. Concrete production releases compounds into the air and water that contribute not just to global warming, but also to acidification and eutrophication. Concrete has the ability to lift our society upwards, up to 163storey in the case of Dubai's Burj Khalifa tower, producing living space out of thin air. However, it also spreads the human footprint outwards, suffocating habitats and destroying valuable topsoil. The conversion of wildness to agricultural, industrial estates, and residential blocks is driving the biodiversity catastrophe, which many experts feel is as serious as climate change. For hundreds of years, humanity has been ready to bear this environmental cost in exchange for concrete's undeniable advantages. However, the scales may suddenly be moved in the opposite direction. Some environmental benefits can be perceived from this perspective, stemming from a structure's endurance and the capacity to shape its environmental profile through material construction optimization. In 1992, because the “United Nations Conference on Environment and Development” promoted the idea of sustainable development, green building gradually became the direction of development. As a result, green construction is designed to reduce the built environment's total impact on human health and the natural environment by efficiently using energy, water, and other resources, as well as decreasing waste, pollution, and environmental damage. This paper explores several green building materials that are both environmentally friendly and more effective in a range of methods.

II. ECO–FRIENDLY BUILDING MATERIALS-

Construction has traditionally relied on earth bricks, concrete, and wood. They have been and will continue to be utilized in everyday construction, implying the continuing felling of trees for timber and the extraction of resources to create cement for bind sand, gravel, and bricks. There are innovative processes, as well as sustainable and green building material options, that can be applied in construction today for a better society. Here are a few examples of environmentally friendly and sustainable building materials.

A. CORKS

Cork, like bamboo, grows quite quickly. It can also be taken from a living tree that continues to grow and generate more cork, which is a type of tree bark. Even after surviving sustained pressure, cork is durable, flexible, and returns to its original shape. It is a common component in floor tiles due to its durability and resistance to wear. It also absorbs sound well, making it ideal for insulation sheets, and its high shock absorption properties make it ideal for sub-flooring. It's also a strong thermal insulator because it's fire resistant (especially if left untreated) and doesn't emit hazardous fumes when burned. Cork does not absorb water or rot since it is essentially impermeable. Unfortunately, it can only be obtained from the Mediterranean, which makes shipment prohibitively expensive. Fortunately, it is extremely light, requiring just a small amount of energy and emissions to transport.

C.HEMP

Hemp is a concrete-like material made from the hemp plant's woody core fibres. The fibres are bonded with lime to create strong and light concrete-like shapes. Hemp concrete bricks are lightweight, lowering the amount of energy required to transport them. Hempcrete is durable, thermally and acoustically insulating, and fire resistant. Its most important sustainable feature is that it is CO2 negative, which means it absorbs more CO2 than it emits. Hemp is a fast-growing, renewable resource within itself.

E.ALGAE

Algae is one of the world's fastest-growing organic materials, and it has the potential to help reduce the industrial industry's carbon impact. They offer a variety of advantages, but the two most important are their ability to improve air quality by collecting carbon dioxide and their ability to produce biofuel, which can then be used to power buildings.

Because buildings account for the majority of energy use, the use of algae in buildings which can generate their own power will have a significant impact on total energy consumption.

B. MYCELIUM

It is a completely natural building material. The root structure of fungus and mushrooms is constituted of mycelium, a natural unicellular species. In moulds or forms, it might be coaxed to grow around a composite of other natural materials, such as ground-up straw. The lightweight and sturdy bricks or other shapes are then air-dried. Mycelium could be moulded into practically any shape and utilised as a remarkably strong building material when combined with processed sawdust. There is the potential to create durable and lightweight bricks and construction parts with unusual shapes. Because the mushroom-based building material can resist severe temperatures, it's a natural and compostable alternative to home insulation, Styrofoam, and even concrete.

D.RAMMED

EARTH It is a technology that has been utilized for thousands of years and lasts a very long period in human civilization. It is a common and cost-effective method of constructing solid foundations, floors, and walls by compacting natural materials such as chalk, earth, gravel, or lime. When pressed hard in wooden forms, it produces walls with a concrete-like feel. The use of rebar or bamboo in rammed earth structures makes them safer or more reinforced. The use of a mechanical tamper can drastically minimize the amount of time and effort required to build solid walls. Thermal storage can be achieved by using rammed earth walls and floors, which allow the sun to warm them during the day and gently release the warmth during the cooler evenings.

III. A SUCCESSFUL EXAMPLE OF SUSTAINABILITY-

The BIQ House is the world's first algae-powered building. This isn't the first-time algae has been used in a building's architecture. Arup, a London-based engineering firm, launched the BIQ (Bio-Intelligent Quotient) House, the world's first algae-powered building, in 2013. The five-story BIQ building in Hamburg, Germany, was designed in collaboration with the German consultancy SSC Strategic Science Consult and the Austrian firm Splitterwek Architects, and features an innovative outer shell made up of live microalgae encased in glass louvres, allowing the building to generate its own energy and provide shade to its occupants. "Using biochemical processes for adaptive shading is a truly unique and sustainable approach," explains Jan Wurm, a research leader at Arup. "It offers an aesthetically fascinating look that architects and building owners will like, in addition to generating renewable energy and providing shade to keep the inside of the structure cooler on bright days." The algae are provided with nutrients and carbon dioxide by sunlight on a regular basis, and photosynthesis allows the microorganisms inside to expand and produce heat, which is either utilised to heat the building's water tanks or stored for later use. The algae biomass can be converted to biogas or used to create secondary medicinal or culinary products after being harvested and dried.

IV. GREEN BUILDING INITIATIVES IN INDIA-

Indian Green Building Council (IGBC)- The green building movement, which began in India in 2001, has made remarkable progress. Stakeholders such as architects, developers, MEP/green building consultants, builders, suppliers, and manufacturers have embraced green in all phases of design and construction. There are over 2000 green building projects in the country that are currently active [6], and India is currently ranked above all of countries that have embraced sustainability. While many green projects are up and running, there is now a compelling need to ensure that the advantages are sustained over the project's lifetime. The IGBC has created the "Performance Challenge for Green Built Environment" programme to help fully certified green building projects maintain their green status. During the IGBC's flagship event, Green Building Congress, outstanding projects that have exhibited leadership in their respective typologies will be recognised and acknowledged.

V. CONCLUSION

As the construction sector rises throughout, the use of green building materials is becoming increasingly important in order to protect the environment. As the research paper describes a few materials which can be replaced by concrete, there are a few materials that are pricey and won't be easily affordable, which could lead to problematic development because convincing individuals to go over their credit limit will be tough. However, there are a greater number of green building materials that are both inexpensive and easily accessible. The use of these materials will not only benefit the natural environment, but will also benefit human health and lifestyle. We also benefit from the materials' varied advantages as a result of their composition.

DEVELOPMENT OF WASTE CLOTH MODIFIED BITUMINOUS -MODIFIED ROAD CONSTRUCTION

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Abstract—

Abstract - Bitumen is a complicated viscoelastic material that has a significant role in the asphalt pavement behaviours. It contributes in around 95% of pavement construction all over the world. These asphalt-based pavements are exposed to different types of distresses over time due to the increase of the heavy traffic and change in weather condition during the last few decades Among those distresses, the permanent deformation, fatigue and low temperature cracking failures are the most common, which are considered one of the main parameters that govern the durability of the asphalt pavement. Millions of dollars have been spent every year to maintain and repair these pavement failures. The researchers and engineers are also continuously seeking for enhancing the properties and performance of asphalt mixtures and pavements. As a sense of responsibility to reduce such cost and develop a sustainable product the research has identified two new modified bituminous mix prepared using waste cloth. This paper intends to review various technical paper on different fibre modified bituminous mix in order to use it as a guide to develop the new modified bituminous mixes using waste denim fibre and synthetic cloth fibre (obtained from waste cloth).

Keywords— Bituminous mix, Synthetic cloth fibre, WDF (Waste Denim Fibre), OBC (Optimum Binder Content), OFC (Optimum Fibre Content), wet process, dry process

ASCE Student Chapter
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I. INTRODUCTION

India has a road network of over 4,689,842 kilometres (as in 2013), the second-largest road network in the world. More than 98% of the total road network comprises of flexible pavement. Bitumen has been widely used in the construction of flexible pavements for a long time. This is the most simple and convenient type of construction but due to increased traffic factors such as heavier loads, higher traffic volume and higher tyre pressure, it resides in the number of failures represented by low-temperature cracking, fatigue cracking, and surface rutting causing its quality and performance to decrease. Therefore, there is a huge demand for higher performance pavements that improve its service life. In order to do so conventional bitumen mix, need to be improved or modified using various modifiers. Numerous research has been conducted and various technical paper have been published related to modification of bituminous mix using various fibres such as asbestos, rock, wood, glass and cellulose fibres. But government and researchers are looking for new fibre materials from industries and urban solid waste to be used in flexible pavement construction. Today, solid waste generated comprises majorly of textile cloth waste out of which 80-90% is produced using synthetic fibre making it non-degradable and a serious hazard to the environment. Nearly 17 million tonnes of textile waste are produced in the world and most of this waste is either dumped in landfills or incinerated which is toxic for the environment owing toits contribution towards increasing the global carbon footprint. This waste cloth can be developed as a sustainable, alternative modifier to be used in the bituminous mix as the fibres present in them have the ability to improve the rut resistance, fatigue life properties, aggregate-binder bond and low temperature cracking.

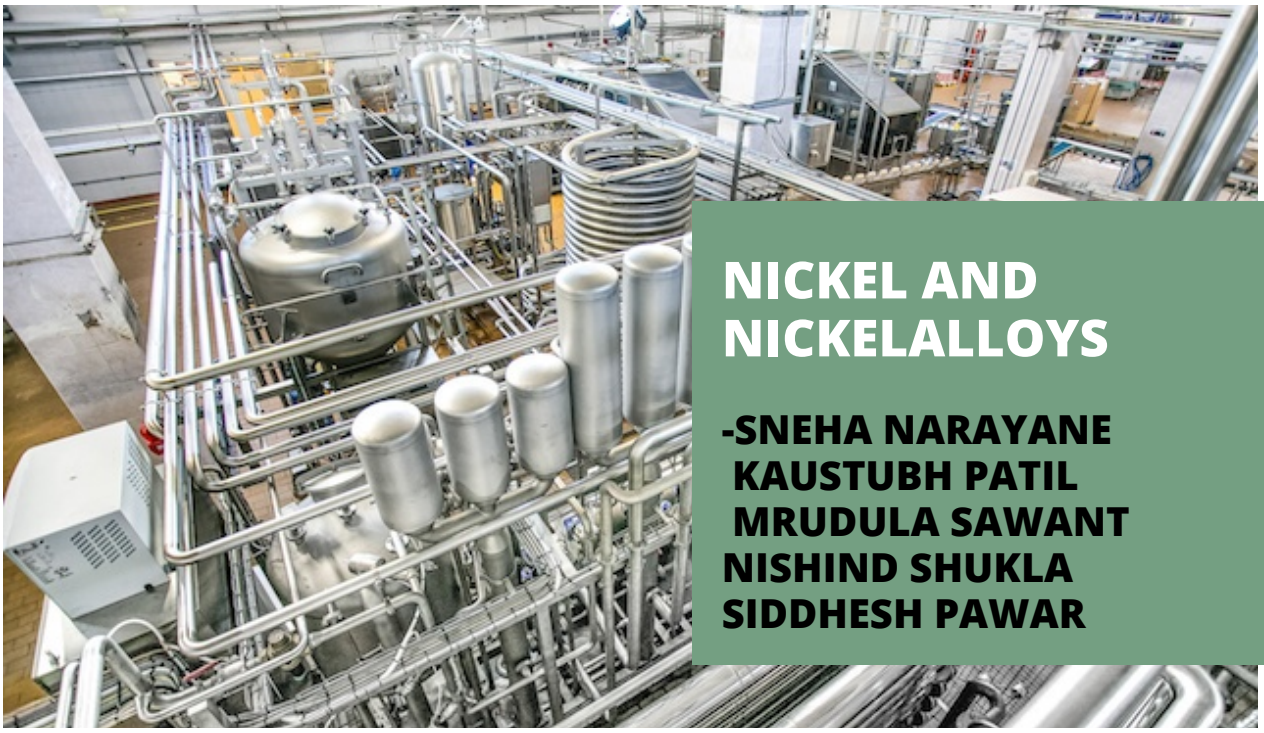
II. OBJECTIVES

The major objectives of this study are to develop a new modified bituminous mix using synthetic fibre. However, on a wider note the exact objectives of this study shall be dealing with following points:

1. To suggest alternatives to overcome challenges faced by conventional asphalt-bituminous mixes to solve the most crucial problem of repair and maintenance and fatigue cracking
2. To study the use of waste denim fibre and synthetic cloth fibre as a modifier for bitumen used in asphalt mixes for flexible road construction.
3. To experimentally determine the effect of Waste Denim Fibre and synthetic cloth fibre on the properties of bituminous mix and hence compare it with the conventional bitumen binder
4. To experimentally analyse the optimum amount of Waste Denim Fibre and synthetic cloth fibre to be used as modifier for binder.

IV. CONCLUSIONS AND FUTURE SCOPE

The method of mix design, experimental approach and processes of introduction of any fibre in a fibre modified bituminous mix were discussed in the literature review of different technical paper. These review paper will serve as a reference and a source of valuable information for further research and development of the two new modified bituminous mixes, that are, Waste Denim Fibre Modified Bituminous Mix and Synthetic Cloth Fibre Modified Bituminous Mix. It can be thus concluded that the above two mentioned bituminous mixes are an unexplored area of research in the field of modification of conventional bituminous mix. However, further research on these modified bituminous mixes regarding the process of introduction of cloth fibre, its properties, its compatibility, its benefits together with experimental testing and analysis of result needs to be worked upon in the near future.



NICKEL AND NICKELALLOYS

-SNEHA NARAYANE
KAUSTUBH PATIL
MRUDULA SAWANT
NISHIND SHUKLA
SIDDHESH PAWAR

Abstract— This paper highlights the usefulness of nickel as a metal. Discussion is made about the global sources of this metal in context of its abundance and suitability of extraction. The processes of extraction from nickel ores are mentioned. Narrating its major physical properties, enumeration is made of different nickel alloys and their uses. Finally the novelty of nickel alloys as immune to chemically and mechanically aggressive service condition is discussed in consideration of austenitic stainless steels as benchmark.

Keywords— Properties, extraction, refining, nickel alloys

I. INTRODUCTION

The first reported use of nickel Ni was in a nickel–copper-zinc alloy produced in China in the Middle Ages and perhaps earlier. Alloys of nickel may have been used in prehistoric times. The metal was first isolated for analytical study in the mid-1700s by Axel Cronstedt, who named it nickel, which derives from the German word Kupfer nickel, or false copper. Elemental nickel has a face-centred cubic structure. Nickel is a silver-white metal, harder than iron, It is capable of taking brilliant polish and it is magnetic below 360 °C. When compact, nickel is not oxidized on exposure to air at ordinary temperatures. Stainless steel accounted for more than 60% of primary nickel consumption in the world. Due to country's relatively large number of speciality metals industries. So therefore, speciality uses include superalloys and related aerospace alloys, high-temperature nickel-chromium alloys, electrolytic plating, electroless plating, cupronickel alloys, and naval brasses. Manufacturers of rechargeable batteries have been using increasing amounts of nickel-metal foam. The renewable energy sector and all of its expanding subsectors for generating power are potential important users of nickel and nickel alloys. Nickel metal is available in many wrought forms and usually is designated as Nickel 200 or Nickel 201 and according to the Unified Numbering System (UNS) as UNS N02201, 205 (UNS N02205), and 270.

Nickel 200 is the general-purpose nickel used in ambient-temperature applications in food processing equipment, chemical containers, caustic-handling equipment and plumbing, electromagnetic parts, and aerospace and missile components Nickel 201 has a much lower trace carbon content than the 200 and is thus more suitable for elevated temperature applications. The lower carbon content prevents elevated temperature stress–corrosion cracking. DURANICKEL alloy 301, which contains about 4.5 wt. % aluminium and 0.5 wt. % titanium can be aged to form very fine precipitates. This type of alloy combines high strength and hardness with the excellent corrosion resistance. Various nickel metals are also used as electrodes for joining ferritic or austenitic steels to high nickel-containing alloys and for welding the clad side of nickel-clad steels. Nickel has excellent corrosion-resistance properties. Nickel and nickel alloys are useful in reducing environments and under some oxidizing conditions in which a passive oxide film is developed. In general, nickel is very resistant to corrosion in marine and industrial atmospheres, in distilled and natural waters, and flowing seawater. Nickel has excellent resistance to corrosion by caustic soda and other alkalis. In nonoxidizing acids, nickel does not readily discharge hydrogen. Hence, nickel has fairly good resistance to sulfuric acid, hydrochloric acid, organic acids, and other acids, but has poor resistance to strongly oxidizing acids such as nitric acid. Nickel has excellent resistance to neutral and alkaline salt solutions. Nonoxidizing acid salts are moderately corrosive, and oxidizing acid salts and oxidizing alkaline salts generally are corrosive to nickel. Nickel also is resistant to corrosion by chlorine, hydrogen chloride, fluorine, and molten salts.

Wrought and cast nickel anodes and sulphur-activated electrodeposited rounds are used widely for nickel electrodeposition onto many base metals. Nickel also can be plated by an electroless process. Nickel plating provides resistance to corrosion for many commonly used articles, e.g., pins, paper clips, scissors, keys, fasteners, etc, as well as for materials used in food processing, paper and pulp industries, and the chemical industry, each of which is often characterized by severely corrosive environments. Nickel plating is used in conjunction with chromium plating to provide decorative finishes and corrosion resistance to numerous articles. Nickel plating is used to salvage worn, corroded, or incorrectly machined parts. Nickel electroforming, in which nickel is electrodeposited onto a mould, which subsequently is separated from the deposit, is used to form complex shapes, e.g., printing plates, tubing, nozzles, screens, and grids. Porous nickel electrodes made from nickel powder are used in storage
batteries and fuel cells. Nickel-cadmium batteries have attractive properties including long operating and storage lives, high-rate discharge capability, high-rate charge acceptance, and high and low-temperature capability. Nickel also is an important industrial catalyst. The most extensive use of nickel as a catalyst is in the food industry in connection with the hydrogenation or dehydrogenation of organic compounds to produce edible fats and oils. A nickel-based catalyst has been reported for forming conjugated diene polymer. Nickel foam can be used as a pin connector for inert anodes. A hydrogen-absorbing alloy and electrode for nickel-metal hydride secondary batteries have been reported. These batteries are for use in hybrid electric vehicles.

II. PROPERTIES

Nickel occurs in the first transition row in Group 10 (VIIIB) of the Periodic Table. Some physical properties are given in Table 2. Nickel is a high melting point element having a ductile crystal structure. Its chemical properties allow it to be combined with other elements to form many alloys Selected chemistries and properties of commercially available nickel and typical cast and wrought nickel alloys. Nickel-base alloys provide excellent mechanical properties from cryogenic temperatures through temperatures over 1000 ℃. Nickel alloys are strengthened by solid solution hardening, carbide strengthening, and precipitation hardening.

The treatments used to recover nickel from its sulphide and lateritic ores differ considerably because of the differing physical characteristics of the two ore types. The sulphide ores, in which the nickel, iron, and copper occur in a physical mixture as distinct minerals, are amenable to initial concentration by mechanical methods, e.g., flotation, and magnetic separation. The lateritic ores are not susceptible to these physical processes of beneficiation, and chemical means must be used to extract the nickel. The nickel concentration processes that have been developed are not as effective for the lateritic ores as for the sulphide ores.

ATOMIC WEIGHT	58.71
CRYSTAL STRUCTURE	FCC
LATTICE CONSTANT	0.35238
MELTING POINT	1453
BOILING POINT (BY EXTRAPOLATION)	2732
DENSITY	8.908
SPECIFIC HEAT	0.44
AVG.COEFFICIENT OF THERMAL EXPANSION	13.3
THERMAL CONDUCTIVITY	82.8
ELECTRICAL RESISTIVITY	6.97
TEMPERATURE COEFFICIENT OF RESISTIVITY	0.0071
INITIAL PERMEABILITY	239
MAX PERMEABILITY	0.251
MODULUS OF ELASTICITY	2.51-3.77
TENSION	206
SHEAR	73.6
POISSON'S RATIO	0.3
REFLECTIVITY	87
TOTAL EMISSIVITY	45

III. NICKEL ALLOYING

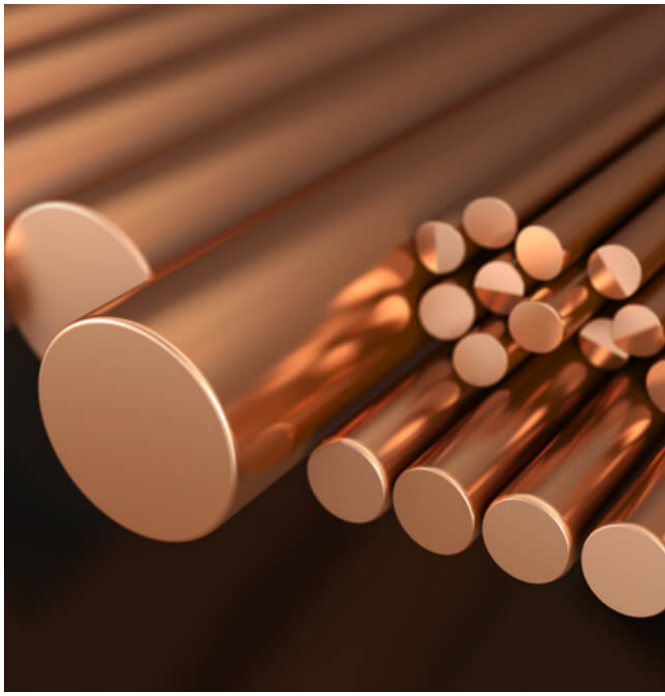
Nickel is alloyed into low alloy steels, ferritic alloy steels, and austenitic stainless steels through the conventional steelmaking processes, e.g., open hearth, basic oxygen conversion, and the argon–oxygen decarburization (AOD) processes.

The AOD process is used to produce a substantial quantity of stainless steel in the world. It is a highly productive process that yields cleaner products at lower operating and materials costs as compared to the older conventional electric-arc-furnace (EAF) steelmaking practice. EAF or AOD melting and air-induction melting (AIM) are used for some nickel-base alloys. Electroslag remelt (ESR) processing also is used to further refine these steels and nickel alloys. Nickel alloys that are heavily alloyed with other elements including the nickel-base and iron-base superalloys, also are produced by vacuum-induction melting (VIM). The alloying, the metal treatments are carried out by a vacuum. For further alloy refinement, VIM castings are used as electrodes and are ESR- or vacuum-arc remelted (VAR). Investment castings of the chemically complex nickel-base alloys, especially those containing the reactive elements aluminium and titanium, also are carried out under vacuum. More recently, directional solidification techniques, in which the heat is extracted directionally through a controlled solidification rate and temperature gradient, are used to produce either monocrystalline nickel-base superalloys or polycrystalline structures having long columnar grains.

Gas powder-atomizing techniques, which involve VIM master melts, also are used routinely to produce fine nickel-base powders for subsequent powder metallurgical consolidation of near-net-shape components. Melting technologies involving electron-beam and plasma melting are also being used to melt nickel alloys.

B.NICKEL-COPPER

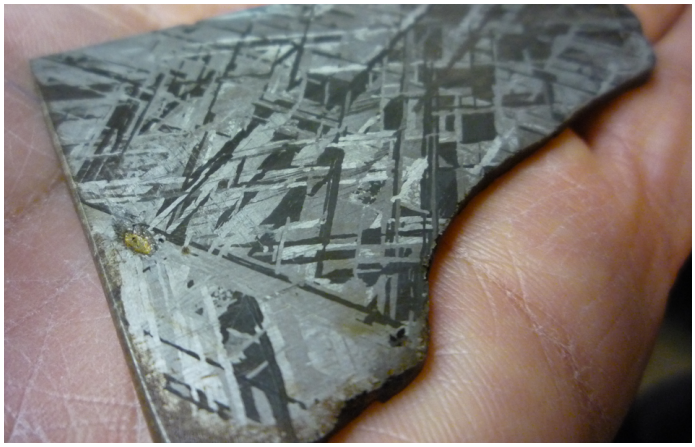
In the solid-state, nickel and copper form a continuous solid solution. The nickel-rich, nickel-copper alloys are characterized by a good compromise of strength and ductility and are resistant to corrosion and stress corrosion in many environments, in particular water and seawater, nonoxidizing acids, neutral and alkaline salts, and alkalis. These alloys are weldable and are characterized by elevated and high-temperature mechanical properties for certain applications. The copper content in these alloys also ensures improved thermal conductivity for heat exchange. MONEL alloy 400 is a typical nickel-rich, nickel-copper alloy in which the nickel content is ca 66 wt. %. MONEL alloy K-500 is essentially alloy 400 with small additions of aluminium and titanium. Ageing of alloy K-500 results in very fine g0 -precipitates and increased strength Typical applications for the nickel-copper alloys are in industrial plumbing and valves, marine equipment, petrochemical equipment, and feedwater heat exchangers. The age-hardened alloys are used as pump shafts and impellers, valves, drill parts, and fasteners. Nickel–copper alloys also are used as coated electrodes or filler alloys for welding purposes. Coinage is typically an alloy of 75 wt. % Cu and 25 wt. % Ni. Copper and nickel can be alloyed with zinc to form nickel silvers. Nickel silvers are ductile, easily formed and machined, have good corrosion resistance, can be worked to provide a range of mechanical properties, and have an attractive white colour. These alloys are used for ornamental purposes, as silver-plated and uncoated tableware and flatware; in the electrical industry as contacts, connections, and springs; and as many formed and machined parts. Nickel-Chromium



Nickel and chromium form a solid solution up to 30 wt. % chromium. Chromium is added to nickel to enhance strength, corrosion resistance, oxidation, hot corrosion resistance, and electrical resistivity. In combination, these properties result in the nichrome-type alloys used as electric furnace heating elements. The same alloys also provide the base for alloys and castings which can withstand hot corrosion in sulphur and oxidative environments, including those containing vanadium pentoxides which are by-products of petroleum combustion in fossil-fuel electric power plants and aircraft jet engines. Without these additions, the nichrome-type alloys provide hot oxidation or hot corrosion resistance through the formation of surface nickel-chromium oxides. Aluminium provides for surface Al2O3 formation and the yttrium or other rare-earth additions improve the adherence of the protective oxide scales to the nickel-chromium–aluminium substrates.

C. NICKEL-IRON

A large amount of nickel is used in alloy and stainless steel and cast irons. Nickel is added to ferritic alloy steels to increase the hardenability and to modify ferrite and cementite properties and morphologies, thus improving the strength, toughness, and ductility of the steel. In austenitic stainless steel, the nickel content is 7–35 wt. %. Its primary roles are to stabilize the ductile austenite structure and to provide, in conjunction with chromium, good corrosion resistance. Nickel is added to cast irons to improve strength and toughness. Many nickel-iron alloys have useful magnetic characteristics and are used in a wide range of devices in the electronics and telecommunication fields. Some nickel-iron alloys are magnetically soft and have attractive properties of high initial permeability, high maximum magnetization and low residual magnetization, low coercive force, and low hysteresis and eddy-current losses. These properties are sensitive to alloying and to precipitate and grain morphologies. Important soft magnetic alloys are based on compositions of 78 wt. % Ni–22 wt. % Fe, 65 wt. % Ni–35 wt. % Fe, and 50 wt. % Ni–50 wt. % Fe, which often include a few weight per cent of molybdenum, copper, or chromium. The majority of permanent magnets are made from magnetically hard alloys of nickel and iron that are characterized by high values of residual magnetization and coercive force. The many Alnico alloys, consisting of (14–28) wt. % Ni– (5–35) wt. % Co– (6–12) wt. % Al– (0–6) wt. % Cu– (0–8) wt. % Ti –balance iron, are precipitation-strengthened, hard, brittle alloys in which the magnetic properties are very sensitive to heat treatments .Some nickel-iron alloys have anomalously low thermal-expansion coefficients within certain temperature ranges. This behaviour results from a balance between the normal thermal expansion and a contraction caused by magnetostriction thermostats and thermometers, cryogenic structures and devices, and many other electrical and engineering applications. Demands for improved efficiency in aircraft gas turbines led to the use of a family of age hard able, controlled expansion superalloys for engine seals and casings. INCOLOY alloys 903 (UNS N19903), 907 (UNS N19907), and 909 evolved from a continuing effort to improve the environmental resistance of this Cr-free, FeNi–Co-based system. Another anomalous property of some nickel-iron alloys, which are called constant-modulus alloys, is a positive thermoelastic coefficient, which occurs in alloys having 27–43 wt. % nickel. The elastic moduli in these alloys increase with temperature. Usually, and with additions of chromium, molybdenum, titanium, or aluminium, the constant-modulus alloys are used in precision weighing machines, measuring devices, and oscillating mechanisms.



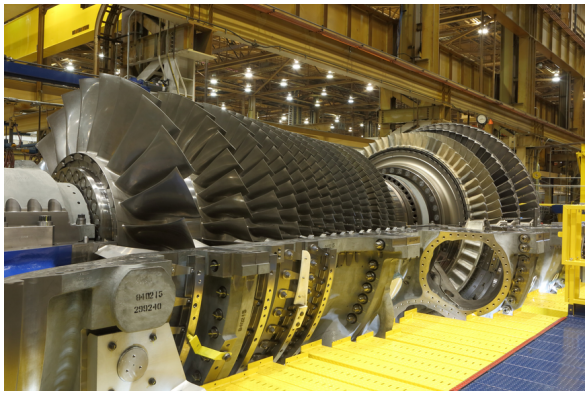
D. NICKEL-IRON-CHROMIUM

A large number of industrially important materials are derived from nickel-iron-chromium alloys. These alloys are within the broad austenitic, gamma-phase field of the ternary Ni–Fe–Cr phase diagram and are noted for good resistance to corrosion and oxidation and good elevated temperature strength. Examples are the INCONEL alloys, which are based on the INCONEL alloy 600 compositions. Alloy 600 is a solid solution alloy with good strength and toughness from cryogenic to elevated temperatures and good oxidation and corrosion resistance in many media. In addition, the alloy is easily fabricated and joined. Many modifications of alloy 600 have been made to produce other alloys with different characteristics. For example, INCONEL alloy 601 (UNS N06601) contains aluminium for improved high-temperature oxidation resistance, INCONEL alloy 625 contains molybdenum and niobium in solid solution for better strength, and INCONEL alloy 690 (UNS N06690) with further additions of chromium was developed for use in the nuclear industry and is particularly noted for its resistance to corrosion by high purity water. Other alloys have been developed for use in particularly corrosive environments at high temperatures. Several of these are age-hard enable alloys that contain additions of aluminium and titanium. For example, INCONEL alloys 718 and X-750 (UNS N07750) have higher strength and better creep and stress rupture properties than Alloy 600 and maintain the same good corrosion and oxidation resistance. Alloy 718 shows excellent stress rupture properties up to 705℃ as well as good oxidation resistance up to 980℃ and it is widely used in gas turbines and other aerospace applications, and for pumps, and tooling. The INCOLOY alloys exemplify another class of nickel-iron-chromium alloys. INCOLOY alloy 800 is resistant to hot corrosion, oxidation, and carburization and has good elevated temperature strength. Modifications of alloy 800 impart different strength or corrosion-resistance characteristics. For example, INCOLOY alloy 801 (UNS N08801) contains more titanium, which, with appropriate heat treatments, can age-harden the alloy and provide increased resistance to intergranular corrosion; INCOLOY alloy 802 (UNS N08802) contains more carbon which provides improved high-temperature strength through carbide strengthening. INCOLOY alloy 825 (UNS N08825) and HASTELLOY alloy G-3 contain molybdenum, copper, and other additions and are exceptionally resistant to attack by aggressive corrosive environments. Alloys 625 and 825 are used in chemical processing, pollution control, marine and pickling equipment, ash-pit seals, aircraft turbines and thrust reversers, and radiation waste-handling systems. The age-hardened INCONEL and INCOLOY alloys are used in gas turbines, high-temperature springs and bolts, rocket motors, spacecraft, and hot-forming tools. There are also nickel-iron-chromium alloys used as welding electrodes and filler metals. HAYNES H-120 has good oxidation resistance and is fixtures and heat-treating equipment, thermal processing equipment, and waste incinerator internals

E. NICKEL-BASE SUPERALLOY-

Superalloys, which are critical to gas-turbine engines because of their high-temperature strength and superior creep and stress rupture resistance, basically are nickel-chromium alloyed with a host of other elements. The alloying elements include the refractory metals tungsten, molybdenum, or niobium for additional solid-solution strengthening, especially at higher temperatures and aluminium in appropriate amounts for the precipitation of g0 for coherent particle strengthening. Titanium is added to provide stronger g0, and niobium reacts with nickel in the solid-state precipitate the g00-phase; g00 is the main strengthening precipitate in the 718-type alloys. Cobalt, generally present in many superalloys in large (10 wt.%) amounts, enhances strength, oxidation, and hot-corrosion resistance. Small excess amounts of carbon usually are present in superalloys for intentional carbide precipitation at grain-boundaries which, as discrete and equiaxed particles, can provide obstacles for grain-boundary sliding and motion, thus suppressing creep at high temperatures. Small or trace amounts of elements, e.g., zirconium, boron, and hafnium, may be present and these enhance grain-boundary strength and improve ductility.

The strength and elevated-temperature properties of a superalloy are dependent on the volume fraction of the fine g0 -precipitates, which can be increased to a 60 wt. %, depending on the aluminium and titanium content. Besides precipitation control at the grain boundaries, improved heat resistance can result from either the elimination of grain boundaries or through the growth of aligned grains with minimum grain boundaries perpendicular to the principal applied stress direction, e.g., in turbine-blade applications. Because of constitutional complexity, the exact chemistries of nickel-base superalloys must be controlled carefully to avoid the precipitation of deleterious topologically close-packed (TCP) phases and extraneous carbides after long-term high-temperature exposure. Heat-treatment schedules and thermomechanical treatments in the case of wrought alloys also are important to provide optimum strength and performance. A cobalt-nickel superalloy can be used in high-temperature machinery and components of gas turbines. Superalloys such as ATI 718 Plus (trademark of Allegheny Technologies) are used in jet and industrial engines.



OBJECTIVES

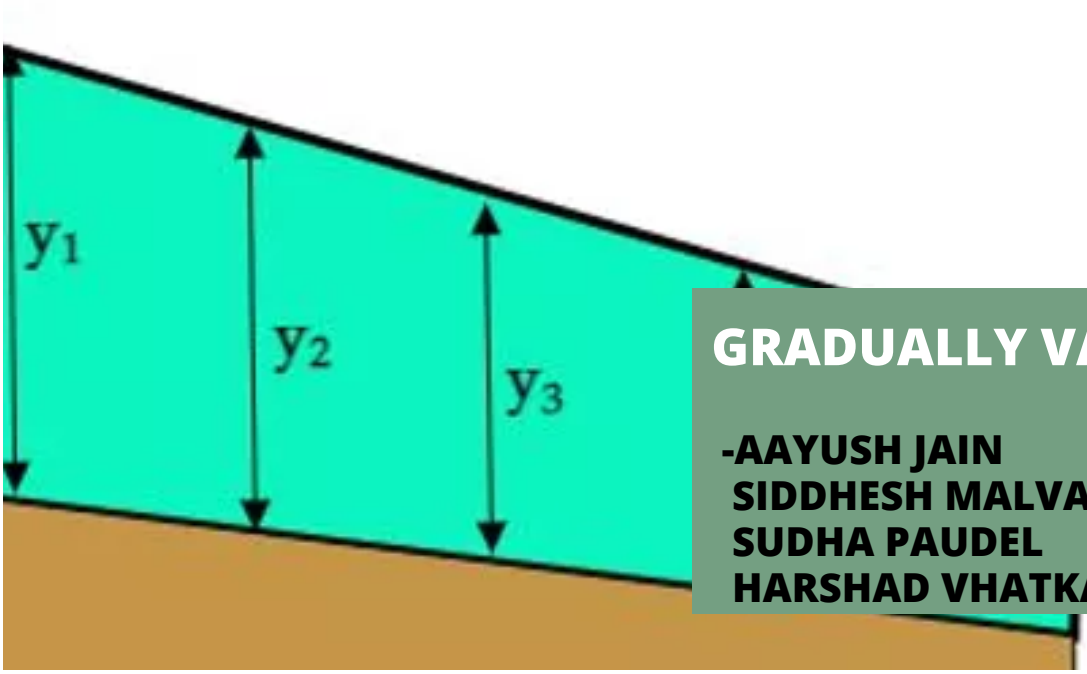
- To optimize the behaviour of structures especially R.C.C buildings against Seismic attacks using modern techniques.
- To study methods to reduce the damage to property and save human lives.
- With the help of different software we can analyse. Those different methods by simulating real life situations.
- To become familiar of new and advanced methods and activities performing worldwide.

METHODOLOGY

In this research, we are going to focus on the problems of how to tackle problems like earthquakes and so, therefore, create a much sustainable and stable building structure. We studied many methods and research papers that included facts like what techniques are being used in this latest technological era and how comparison can be performed to understand the following outcomes. Our approach to carrying out the study was to use software like Midas Gen and Etabs by considering a particular structure and applying different methods and maintaining the records of their outcome thus understanding which method stands out. Our analysis is based on a building we created and lets all the environmental conditions remain constant. It undergoes three rounds of analysis where we kept the loads and seismic factors the same and changed the methods factor. 1st case involves a simple building with no extra supports. the 2nd case consists of a building covered by Shear walls on four sides and at stairs and elevator shaft. The3rdcasecovers Frictional dampers at the edges of the building throughout all the floors. My team and I distributed research papers among us to focus on a particular topic and understand its functioning so that we consider all the points necessary to make a proper analysis of the methods. In this, the methods we are considering are Base isolation, X-Bracing, Shear walls, Seismic Dampers and other methods for our research. We carried out the data through many research papers and internet information also reviewing videos for a better understanding of the process. The present comparative study deals with an equivalent static method for seismic analysis of structure for both RCC and Steel buildings. The analysis of both the building models is run in software\for the analysis the parameters like Story Stiffness, period, Frequency, Base Shear, Lateral forces, and Seismic weight are studied significantly.

There are 4 techniques that has been used lately in modern construction so far which are as follows:

- Pre-Stressed Concrete
- 2. Shape-Memory Alloys
- Base Isolation
- Seismic Dampers
- Shear walls



GRADUALLY VARIED FLOW

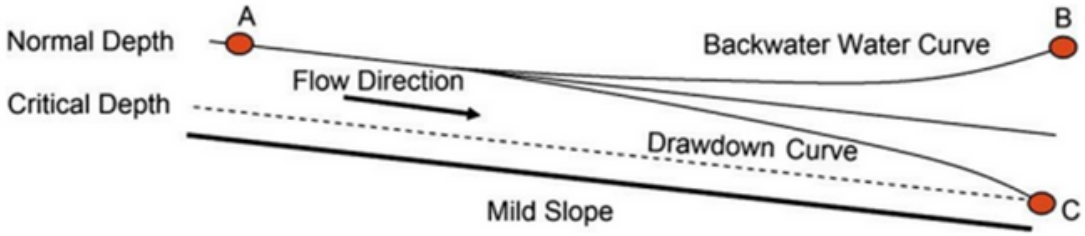
-AAYUSH JAIN
SIDDHESH MALVADE
SUDHA PAUDEL
HARSHAD VHATKAR

Abstract: An innovative approach to teaching the principles of gradually varied flow is presented in the larger context of water resource engineering. Students are encouraged to explore, and critique, an innovative approach for GVF calculation. The goal is to help students establish a more complete understanding of the computational constraints and options.

Introduction:

Hydraulic engineering is a rich field with important historical, cultural and environmental implications. Projects are inevitably complex, achieving their primary and intended benefits but detracting from other ecological, human and economic functions. No comprehensive hydraulic "cookbook" could hope to cover the range of problems that might arise over a student's professional career. Local context, including local culture, influences both a system's operation and maintenance, as well as the functioning of the natural system. Instructors must balance many considerations, ranging from the adopted teaching style to specific questions of curriculum and course coverage. Some facets of engineering education must be modified to fill the gap between teaching and practice. Task Committee on Teaching Hydraulic Design organized a conference session in 2001. The teaching of a dynamic subject should be experienced dynamically. This paper aims neither to dissect different components of such a teaching style nor to quantitatively evaluate the performance of this method over more traditional ones. Instead, its aim is to share an innovative approach to teaching the principles of gradually varied flow.

GVF CALCULATIONS AND FORMATIONS:



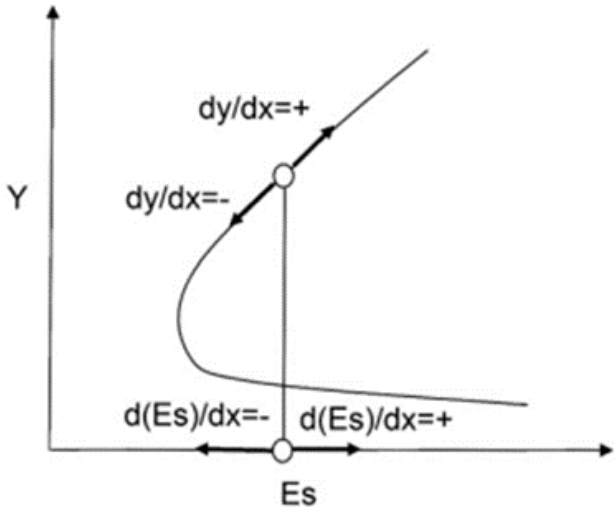


Fig. 2 shows that dy/d is always positive for sub-critical flow, but negative for the backwater and drawdown cases. This is because as we move downstream the energy is continually accumulating (in the case of backwater) or leaking from the system (drawdown). The water surface profile in gradually varied flow is formed as a result of the deposits or withdrawals of mechanical energy from the channel. The amount of accumulation or withdrawal of energy along the channel obviously depends on many factors including channel bed slope, channel roughness, discharge, and the degree of energy level. The second law of thermodynamics governs all real process in nature, an insight that can be presented in many forms.

This law shows that the water surface profile in an open channel tends to be formed in such a way that the least energy is "deposited" or, other words, dissipative withdrawal is maximized along the channel. Water depths in the specified points of the channel can be calculated by an optimization procedure. In this approach the total amount of energy dissipation is maximized. As shown, the channel is divided to N equal distance sections and the flow depths in intermediates computational points (Y2 through YN) are taken as the unknowns. This is a physically sensible way to solve a set of ill-posed nonlinear equation having one equation more than the unknowns. Of course, its limitations is a great discovery, one that lays down a memorable lesson for the student to bear in mind in their own work and designs.

Conclusion:

Using second law of thermodynamics, an innovative approach is formulated for GVF calculation. Microsoft Excel program Solver toolkit is employed to solve the optimization set of equations. Results show that the method not only succeeds in calculating water surface profile but it is also able to capture the hydraulic jump in a single pass.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IMPRESSION

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THANK YOU !