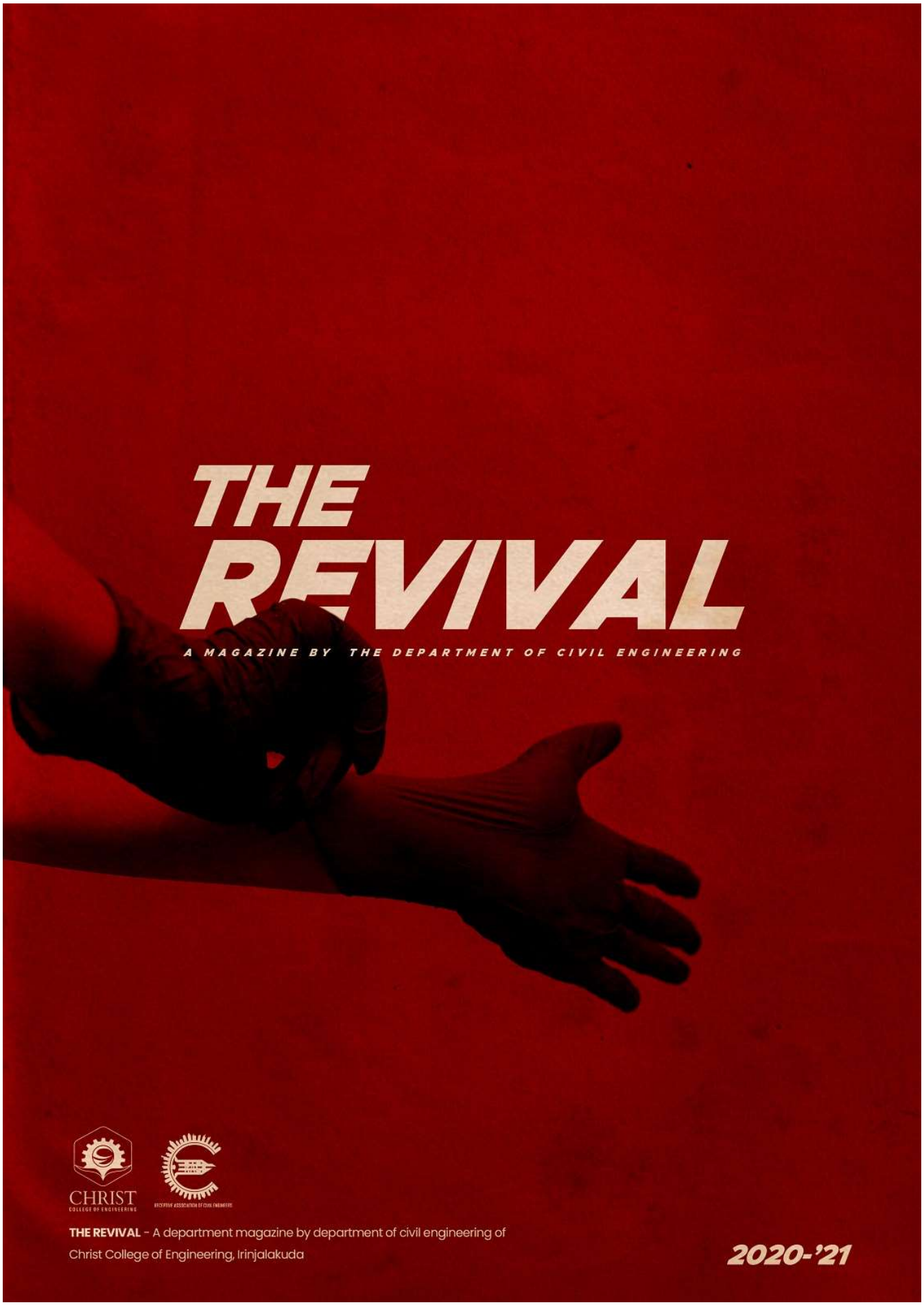

THE REVIVAL
A MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING
CHRIST
COLLEGE OF ENGINEERING
THE REVIVAL - A department magazine by department of civil engineering of
Christ College of Engineering, Irinjalakuda
2020-'21

ABOUT

THE REVIVAL

Expecting everything to fit into refined categories is unrealistic in today's world. This is not just a quintessential magazine. This is an inspiration for the readers that vindicates the revered truth that nearly anything is possible if it is fuelled by unified efforts, and a testament to the fact that knowledge is indomitable in the face of all odds. While you traverse through these pages, we implore you let these dark hues and subdued layers remind you of something: Even if the whole world is engulfed in darkness, knowledge and ideas would still remain lucid and bright.

With that being said, we welcome you aboard this journey amidst a pandemic in an effort to retrieve what was lost. Even though the academic year of **2020-'21** was eventful in several senses, these pages are surely something we would look back with fondness. We hope you find a little bit of yourself along the way, along **The Revival.**

THE REVIVAL

A MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING

CHRIST COLLEGE OF ENGINEERING

CHERISHED WORDS *from*

EXECUTIVE DIRECTOR

My special appreciation to our Civil Engineering department for bringing out 'Revival', their departmental magazine when we are all battling to contain the coronavirus pandemic. This pandemic has taught us many lessons. Now it is the prime responsibility of engineers to learn from these lessons and ensure that they focus on solutions that are in the greater interest of humankind. The pandemic is asking us all to develop a new and global perspective.

Our civil engineering department, like others, is blessed with dedicated and capable staff. I am certain that the students graduating from here will be fully equipped to meet the challenges of the future. May this magazine be able to achieve its intended purpose and much more.

Rev. Fr. John Paliakara CMI

EXECUTIVE DIRECTOR
CCE IJK

THE REVIVAL

A MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING

CHERISHED WORDS *from*

JOINT DIRECTOR

It is indeed very commendable and heartening to note that the Department of Civil Engineering is coming out with their departmental magazine during the Covid pandemic phase. I am particularly impressed with the name of this magazine - Revival. It is aptly capturing the mood and outlook of our society and nation, as a whole, at the moment. The pandemic has thrown open some welcome challenges for civil engineers. Being a civil engineer myself, I hope that the post-covid recovery phase will be able to bring out the best in the civil engineering profession so that communities are connected through the creation and development of resilient and sustainable infrastructure. Our students should prepare themselves to be a part of this change.

I also take this opportunity to laud the efforts of the Staff and Students of the Civil Engineering department for all the various other initiatives taken since the beginning of this pandemic. May this magazine prove to be a beacon of hope and a light in the right direction for the Civil Engineering community at our college and elsewhere. My best wishes to everyone behind the works of this magazine.

Rev. Fr. Joy Payyappilly CMI
JOINT DIRECTOR
CCE IJK

THE REVIVAL
A MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING

CHERISHED WORDS *from*

PRINCIPAL

It is my pleasure to pen down a few words for our Department of Civil Engineering as they bring out their departmental magazine "Revival". I recollect with fondness all the activities and initiatives that they came up with since the Covid pandemic struck us. The post-pandemic period will require civil engineers to be in the forefront in creating innovative and sustainable solutions in infrastructure development. Civil engineers will have to advocate for and create projects that strengthen communities instead of opting for exciting, profitable, and oftentimes damaging ones. I am confident that the department will be equipping our budding civil engineers to face this future.

I am also hopeful that this magazine, true to its name, will be a stepping stone for aspiring civil engineers during this difficult phase of their lives. My congratulations to all involved in making this magazine a reality.

Dr. Sajeev John
PRINCIPAL
CCE IJK

THE REVIVAL
A MAGAZINE BY THE DEPARTMENT OF
CIVIL ENGINEERING

CHERISHED WORDS *from*

VICE PRINCIPAL

I am immensely pleased to know that our Civil Engineering Department is publishing their departmental magazine 'REVIVAL'. I hope that this magazine will show case some of the best creative endeavours of our Civil Engineering students as well as faculty. Today the role of an Engineering department is not only to pursue academic excellence but also to motivate and empower it's students to be lifelong learners, critical thinkers and productive members of ever-changing global society. REVIVAL - as the name indicates is the best action needed to overcome this pandemic situation. I am sure that this magazine will certainly revive the skills of our vibrant Civil Engineering students. I wish them the very best for this, and all the array of activities that the CE department has come up with, in their quest for excellence. I congratulate the HOD, Faculty members and Editorial Board in it's tireless efforts in bringing out 'REVIVAL' the magazine of Civil Engineering department.

Dr. John V. D
VICE PRINCIPAL
CCE IJK

THE REVIVAL
A MAGAZINE BY THE DEPARTMENT OF
CIVIL ENGINEERING

From the

HOD'S DESK

Civil Engineering is one of the oldest, but the evergreen branch of engineering which includes design, construction and maintenance of physical built environment. Civil engineers are responsible for constructions like dams, building, subway tunnels, bridges, highways and other forms of infrastructure that has become a part of our everyday life. In a nutshell civil engineers build the world we live in; which makes civil engineering one of the most significant branches of engineering and also civil engineers are given great responsibilities in public as well as private sectors.

Our department is a group of highly qualified faculty members, having great exposure in industries as well as in academics. Their knowledge and ideas are always conveyed through best academic practices so as to bring out the finest capabilities of our students. Department of civil engineering is also putting all the efforts to encouraged the students in extra-curricular and co-curricular activities which is essential for personality development, nurturing of team spirit and development of organizational skills.

I am really happy to bring out our first department magazine, The Revival . I would like to appreciate the effort of Asst. Prof. Jestine J Thannickal and Asst. Prof. Teena Johnson as well as the entire team behind this for their relentless determination to release our department magazine. It is a great platform for all the creative works done by department staff as well as students in both technical as well as non-technical areas.

'With warm wishes to the entire team'

Dr. Krishnapriya M G
Head of Department of
Civil Engineering, CCE IJK

THE REVIVAL

A MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING

OUR TEAM

CHIEF EDITORS

VARSHA M V
S8 CE

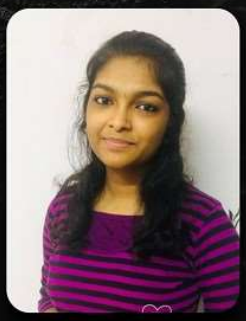
FATHIMA MIZAJ
S4 CE

EDITING TEAM

SONA BOSE
S6 CE

ROSINA SHAJI
S6 CE

MALAVIKA SINSUKUMAR
S6 CE



MALAVIKA C A
S4 CE

ANNS PRINCE
S4 CE

OUR TEAM

CHIEF DESIGNER

ABHIRAM THUMBARATHY
S8 CE

DESIGNING TEAM

SOORYADEV KISHAN P S
S6 CE

ALBERT GEORGE
S4 CE

BHARATH SHARMA
S6 CE

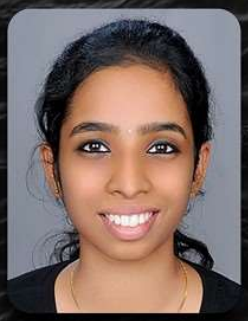
ASWATHI P P
S2 CE

AMAL JOHN
S4 CE

THANMAY THAMPI
S4 CE

OUR TEAM

ASSORTING TEAM



VANI N K
S8 CE

ANNA SAJU
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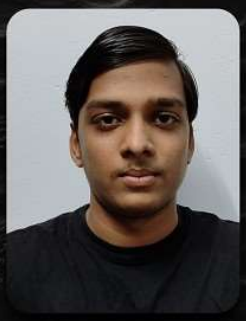
THUSHARA C R
S6 CE



AMAL JOHN
S2 CE

ANITTA K JISHU
S8 CE

SILHOUETTE

THE REVIVAL MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING

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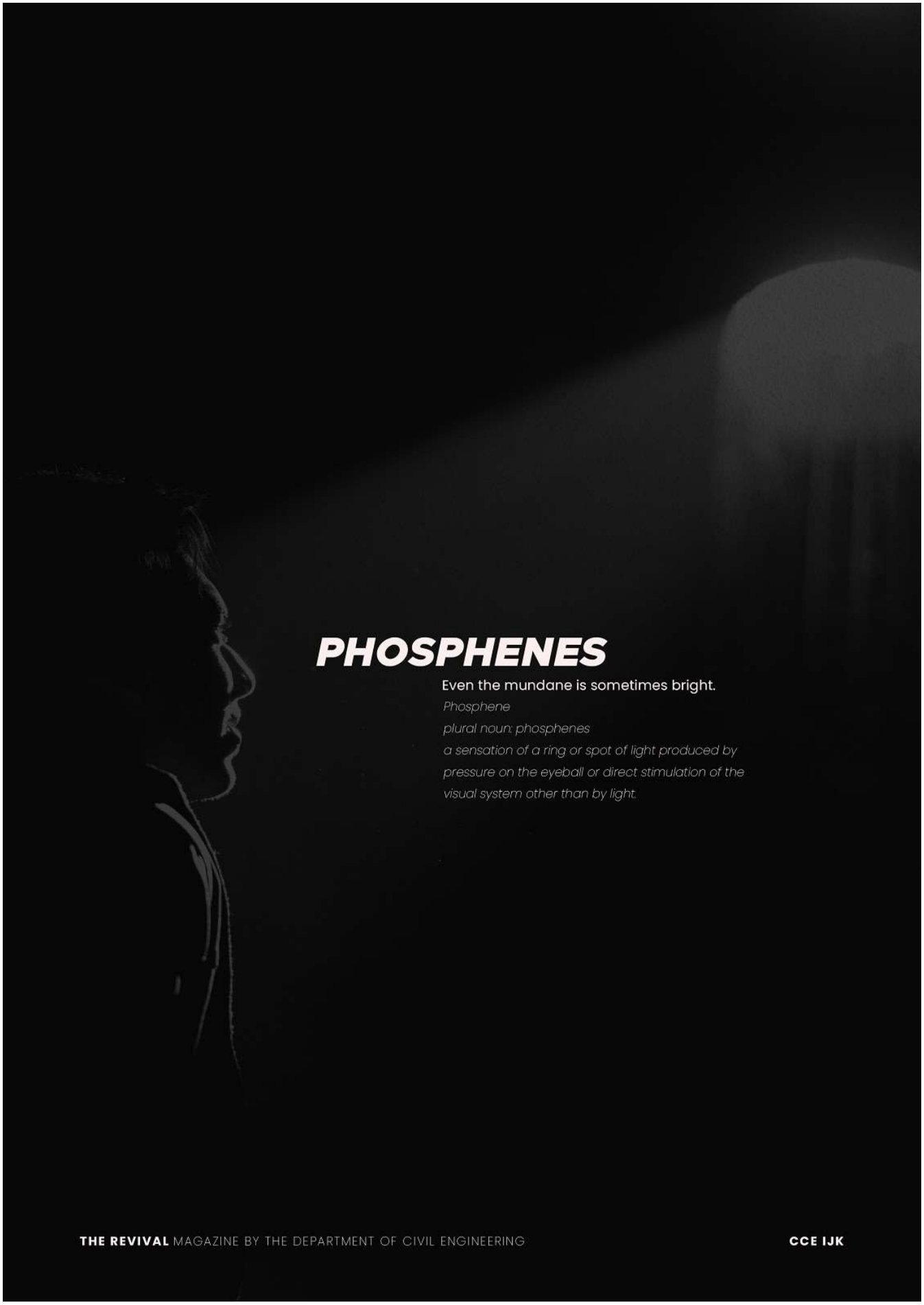

PHOSPHENES
Even the mundane is sometimes bright.
Phosphene
plural noun: phosphenes
a sensation of a ring or spot of light produced by pressure on the eyeball or direct stimulation of the visual system other than by light.
THE REVIVAL MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING
CCE IJK

STRIVING REALM OF CONSTRUCTION

Talking of the year 2020, one could not think of anything beyond coronavirus. It was a year filled with fear for life, loss of loved ones, loss of jobs, financial instability, to say the least! The damages caused by the deadly coronavirus has taken everyone's life for a toss and has affected several industries beyond repair. While the intensity of the impact differs from sector to sector, there are few sectors that have been hit the most and one such sectors is the construction industry.

The COVID-19 pandemic has plunged many global contractors into one of the most challenging times in their history. As countries across the globe introduced lockdowns and other restrictions, the pace of change for contractors has been extreme, with many changing their ways of working overnight. Contractors have had to try and complete existing projects while at the same time protect staff on-site, comply with government regulations and travel restrictions, as well as manage supply chain interruptions and project suspensions. Before the COVID-19 situation, the construction industry was recovering from a few minor issues related to policy changes (RERA), changes in taxation (GST), and demonetisation. The industry exhibited good signs of recovery post the announcement of multiple schemes by the Government of India, such as Pradhan Mantri Awas Yojana (PMAY), SBI-CAPs, and one-time settlement of taxes such as service tax. Everyone was bullish about the industry, and customers were willing to invest. But, everyone was caught off-guard with the COVID-19 pandemic. The focus of the Government has now shifted towards the safety and welfare of the people. The focus now is on controlling the spread of the virus. To combat the disease, the Government, in March 2020, had announced a total lockdown for more than a month. This left millions of skilled and

unskilled workers unemployed, the majority being the migrant workforce. The industry also faced a plethora of setbacks due to labour migration, limited supply of raw materials, and general scare revolving around the spread of COVID-19. At the same time, the halt in construction activities has put forward several challenges before the customers/investors who have invested their savings, expecting timely delivery of projects. The Country-by-country variances in rules and restrictions relating to the pandemic also exacerbated these challenges.

However, contractors are used to adapting quickly and implementing various continuity strategies — for example, as they ramp up for new projects, downsize in some areas, or adapt to changing project timeframes. This agility has placed construction companies in good stead during the pandemic, and will remain vital in future. Surveys of construction professionals were conducted in different parts of the world. Most contractors continue to operate with some adjustments to daily protocol. One of the main challenges faced by the contractors is the health and safety of the workers. Although health and safety already were priorities in the construction industry, they need to continue keeping workers safe from the COVID-19 virus. This means cleaning more often and more thoroughly, mandating social distancing on worksites and requiring masks and gloves, even when a particular job doesn't require them. Follow guidelines set by your state and local governments and health authorities such as the Centers for Disease Control and Prevention. Routine COVID test are now a routine in construction sites. It takes more time, money etc. Profits are non-existent compared to pre-corona. Another important challenge is the customers. Customers may be angry about delays and cancellations or may no longer have the funds to complete the projects they've hired to build. If possible, the contractors should try to reassure them and devise mutually agreeable new timelines and budget. Even if they offer concessions, some customers may try to pull out of their commitments, including for jobs that are nearly completed. In such cases, should work with their legal advisors to determine the best course of action. The main motto of any contractor should be to expect the unexpected. In the coming months, the primary challenge as a contractor will likely be uncertainty — financial, economic and social. If there's anything they should expect from the COVID-19 virus, expect more twists and turns.

Amidst all the challenges, the construction industry has also played their part in the fight against Covid-19. From building hospitals in just a few days to donating lifesaving equipment, the industry has played a critical role in responding to the crisis and in the recovery. China managed to build an entirely new hospital in just 10 days. This 25,000-square-metre hospital having 10,000 beds, is to isolate the sick and prevent new infections in the face of the unstoppable escalation of the coronavirus (COVID-19) in central Hubei province. This feat has been made possible by putting together dozens of prefabricated modules. The key, apart from a huge volume of labour, is in the use of prefabricated materials and modular construction. In most cases, time is saved by using structures that are completely assembled beforehand, with their facades, windows and even their installations already in place. Once at the site where the building in question is to be erected, the modules are assembled with great precision. Lightweight facades and the use of steel and reinforced concrete structures allow for cost savings and faster construction times than with other materials. In addition, the new building systems serve to create resistant infrastructures that are adapted to the needs of the environment, from withstanding earthquakes to having high levels of energy efficiency. The panic-built Huoshenshan hospital was also modeled on the blueprints of a medical facility which was set up in Beijing in 2003 to help tackle the SARS epidemic, which also helped speed up the construction process, according to Quartz.

The Indian Institute of Technology, Madras also incubated a start-up Modulus Housing that has developed a portable hospital unit that can be installed anywhere within two hours by four people. Called 'MediCAB,' it is a decentralized approach to detect, screen, identify, isolate and treat COVID-19 patients in their local communities through these portable microstructures, a statement released by the institute said. MediCAB has been launched recently in Wayanad district of Kerala where the units are being deployed to treat COVID-19 Patients. The startup is developing micro hospitals that can be deployed rapidly across the nation. The Medicab is fold-

able and is composed of four zones – a doctor's room, an isolation room, a medical room/ward and a twin-bed ICU, maintained at negative pressure. This deployment in Kerala has been undertaken with grant funds from Habitat for Humanity's Terwiliger Centre for Innovation in-Shelter. The startup collaborated with Sree Chitra Tirunal Institute for Medical Sciences and Technology who provided inputs on the certifications and customizations necessary for the project. Founded by two IIT alumni in 2018, Modulus Housing was supported by IIT Madras Incubation Cell and has a vision to revolutionize housing through modular prefab structures. They have re-purposed their designs to support the fight against COVID-19. Modulus is working on a Dual design where these can be rapidly launched as COVID-19 isolation wards. PostCOVID-19, these can be transformed into micro-hospitals/clinics in Rural India where the medical infrastructure needs to be augmented. Modulus Housing has set up its manufacturing unit at Chengalpet (located about 35 kms from Chennai). India has 0.7 beds per 1,000 persons. Innovations such as the MediCAB will help boost the health-care infrastructure in India as it can be rapidly transported (six units can fit in a truck). It can be deployed at any time and to any place. This is just an example of the ways technology upgrades are helping the construction industry deliver on housing and other building needs. No matter the personal impact of COVID, the way we all approach personal and public space has been altered and will redefine the way we approach engineering, construction and operations moving forward. Digital transformation in the construction industry is essential to meeting the housing, building, and infrastructure needs of the future that have become more prominent during the COVID-19 global crisis. In order to build better, business processes must be modernized. This often starts with information flow - we're far beyond the days of blueprints being blue, and the stakes high to stay on track by staying true to the design. Businesses are ensuring this by digitizing designs, using 3D modeling software as a guide in the field. Information must also be democratized, digitized, and universally placed into the hands of constructors to

make a real impact on the industry. Just like in the boardroom, when everyone involved in a construction effort has a common understanding of the project design and current status, along with a central point of communication from day one, buildings are much more likely to avoid costly errors and go up on schedule. Another way the construction industry is using technology is via digital twins, defined as dynamic models of real, physical assets. While a digital twin can be made of any object, it is especially useful when used in construction because it containall necessary data from CAD to operating manuals. Housing all of this information digitally makes it possible for builders to understand data quickly and easily share models and predictions. Also, technologieslike 3 D printing can take on a number of tasks on construction sites to increase delivery by 50-80%. The world requires more affordable housing now and automation, alongside humanknow, will make it possible to make this a reality in record time.

Aliya Kodanchery & Alfin David
S8, CE

HARNESSING KINETIC ENERGY

Anything that moves has kinetic energy and it can be defined as the energy possessed by a body due to its motion. Kinetic energy is a source of energy that has been less dwelled upon as compared to other sources of energy like nuclear power, hydropower, fossil fuels, etc. to produce electricity. The latter have been utilized all across the globe to meet our electricity demands. Electricity is a necessity we can't do without in our day to day lives and it is especially a significant element in the housing sector from its construction to its completion as well as maintenance of the structure.

One of the latest civil engineering innovations that involve harnessing kinetic energy from people's footsteps is the Kinetic Footfall which converts it into electrical power. Laurence Kemball-Cook, founder of Pavegen Systems proposed and developed these paving slab tiles to convert energy from pedestrian footfall into electric power. It is a tangible way in which people can engage in renewable power generation. Among the 36 cities in which this technology has been installed includes Bangalore (Smart City Development), Birmingham (University of Birmingham), Bangkok (True Digital City), etc. The structure of the paving tile is such that the top surface of the tile unit is made from stainless steel and recycled rubber. The slab base is constructed with over 80% of recycled material along with concrete. When people step on the pavement tile surface, their weights causes generators underneath the tiles to rotate, generating off-grid power through electromagnetic induction.

A similar idea that explores the potential of kinetic energy in roadways is an Italian start-up called Underground Power. By joining hand with the Polytechnic University of Milan, they've developed a technology called Lybra. Lybra is a tire-like rubber pavement that converts the kinetic energy of moving vehicles into electric power.

These innovations will be commonplace in the near future as our current sources of energy contribute to environmental pollution whereas these technologies that utilize kinetic energy is costeffective, occupies a very little area for electricity generation, emits no pollutants and also has higher efficiency. In the coming years, such cutting-edge technologies are expected to become extensively used and kinetic energy will become as widely popular as other energy sources.

Pavegen- New Digital City, Bangkok

-Ashley Ajith , S8 CE

FROM THRISSIVAPERUR TO THRISSUR

A GLIMPSE ON THE HISTORY OF TOWN PLANNING AND DEVELOPMENT OF THRISSUR CITY

Thrissur, renowned as the cultural capital of Kerala is a city with a strong legacy of cultural, historic and traditional aspects. It is one of its kind in Kerala with a well-planned ring and radial pattern of development. How many of us have wondered about the brains behind this great architecture and planning of this beautiful city? With this article I would like to share few facts that I was not aware of despite being a native of Thrissur for 21 years and I'm sure most of you guys must be too!! This is the story of Thrissur-

The land of Sree Vadakkumnathan, Sree Vadakkumnathan Thampurante swantham Thrissivaperur.

SAKTHAN THAMPURAN –THE MAGNIFICIENT ARCHITECT

The history of modern Thrissur started with Raja Rama Varma IX (Rama Varma Kunhippilla Thampuran), ruler of the Kingdom of Cochin, who shifted his capital from Thrippunithura (Kochi) to Thrissur for centrally administering the Kingdom. Renowned as the legendary Sakthan Thampuran, he masterminded the architecture of Thrissur town.

Old City Map

Sakthan Thampuran

CITY PLANNING BY SAKTHAN THAMPURAN

The city of Thrissur is developed around a centrally located hillock called Thekkinkadu Maidan (ground of the Teak forests), on top of which is the great temple, the abode of Lord Shiva, 'Sree Vadakkumnathan'. In fact, Thrissur got its name from the word 'Thrissivaperur', which is believed to be derived from the Malayalam words 'Thiru-Siva-Per-Ur' which meant 'the land of the Sacred Lord Siva'. The city developed along road networks in ring and radial pattern originating from the road surrounding the central hillock (Swaraj Round). The early initiatives by its rulers towards trade and commerce sowed the seeds for economical and cultural development of Thrissur.

Sakthan Thampuran planned the city of Thrissur according to the principles enshrined in Arthasasthra of Kautilya. The

four major roads that radiate from the centrally located ring road (Swaraj Round) around 'Thekkinkadu Maidan' and originating from the four sides of Vadakkumnathan temple divides the city into four quarters. The city is developed around 'Thekkinkadu Maidan' a 65 acre hillock situated centrally. This hillock constitutes the second highest point in city after the Vilangan Hills, and the Kole Wetlands in the suburbs forms its midlands, which act as a natural drainage for the city and protect the city from floods. Natural and man-made water bodies like ponds, rivers and canals also keep the ground water safe from salinity. The city was planned giving importance to all sectors of the society and definite zoning was adopted for different activities. Eastern region constitute the major residential areas. Sakthan Thampuran brought 51 Christian families to Thrissur and made them settle down in the south-eastern sector. This earmarked the beginning of trade and commerce activities in the town. Brahmins were made to settle in north-western sector which paved way for the indigenous textile production in Thrissur. All these initiatives eventually transformed Thrissur into a hub of trade and commerce activities dominated by gold, textile and financial sectors.

Water bodies of Thrissur constitute to 3% of the total corporation area which includes 3 major water sources and more than 33 small ponds. Of the four water reservoirs; vadakkechira, thekkechira, kizhakkechira and padinjarechira, which SakthanThampuran built in the four corners of the city for the purpose of supplying water, thekkechira and kizhakkechira became extinct owing to the city's development pressures. The remaining main waterbodies in the corporation area are padinjarechira, vadakkechira, pallikkulam and vanjikkulam which have been supporting different varieties of bio-diversity for long, and play a major role in the ground water recharge of the city.

Padinjarechira

Vanjikulam

Vadakkechira

DEVELOPMENT OF LINKAGE ROADS

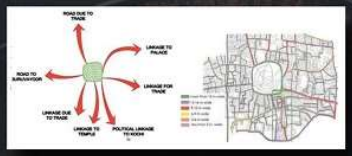
The city developed along seven main link roads that originate from swaraj round and connect the city to surrounding urban centers.

• **College Road**: Developed as the linkage road to Coimbatore, one of the main business districts of South India.

• **Vivekananda Road (Shornur Road):** Way to North Kerala developed for trade and commerce activities.

•**High Road**: developed by Sakthan Thampuran to connect the erstwhile Kingdom of Cochin to Thrissur its administrative centre for carrying out political affairs, later developed into a busy commercial street of the city.

• **Palace Road:** Connects Kollamkode Palace in the north, lined by private and public institutional establishments.



Development of Linkage Roads Around Swaraj Round

• **MG Road:** Major link to Guruvayur temple, the high-end commercial street of the city and also the route to the district administration centre.

• **Kuruppam Road:** Busy Commercial Street that links Koodalmanikyam Temple and Kodungalloor Bhagavathy Temple.

• **M O Road:** Locates the corporation office and many religious and public buildings, and links the city centre with the Sakthan Nagar a prime commercial location in the city.

THE UNTOLD STORY OF PARUKUTTY NETHYAR AMMA – THE WOMAN WHO ASTONISHED THE BRITISH

Sakthan Thampuran who reigned from 1914 to 1932, was assisted by his particularly able consort Parukutty Nethyar Amma. She married the Maharaja, then fourth in line to the succession, when she was fourteen years old in 1888. Since the Maharaja was a scholar and had other interests (including knowledge of how to cure snake bites and

comprehend the language of lizards known as Gawli Shastra), and as he encouraged women empowerment she was assigned to take care of the finances of the state. The British was immensely happy for a woman without formal education taking over the finances of the state as they wanted to control the Cochin province like the Malabar and Travancore provinces. They pushed the state to huge financial debts.

The remarkable measures taken by Parukutty Nethyar Amma like discharging many of palace staff which she found to cause unnecessary expenses, increasing the efficiency of government officials by providing more incentives and encouraging more production within the state, resulted in generation of more revenue. Within 5 years she

paid off the debts of the province and also set out generating extra revenue which astonished the British earning her 17 gun salutations. Further, she was also awarded the title of 'kaisr -i- Hind' By King George V one of the titles awarded to Mahatma Gandhi too.

CONTRIBUTIONS BY PARUKUTTY NETHYAR AMMA

Apart from her exceptional administrative talents, she also performed a marvellous job in reforming the city of Thrissur and Kochi. She decided to concrete the road (Swaraj Round) surrounding the 65-acre hillock called the Thekkinkaadu Maidan. She gave the contract to a British company Cannon Mcgnow and it stated that the company would be held responsible for construction and maintenance of the road for 50 years and 70 per cent of the amount will be paid after the construction. The remaining amount will be paid only after proper examination and evaluation of the maintenance conducted by the company. In any circumstance, if the company fails to maintain the road, taxes would not be paid from any enterprise related to the company and Cochin province leaving behind no loopholes for the company to slack off from maintaining the road.

Drains were constructed on both the sides and concrete pipes were laid above which the road was concreted. The water falling on the central hillock (Thekkinkad maidan) passed through one of the drain and the underground pipes discharging to the ground and water from the other side of the road passed through the other drain finally discharging into the fields. The advanced drainage system promised no water logging issues even during a rainfall of 100cm intensity. Thus far, Swaraj round has experienced no water logging issues and experienced very little during the 2018 floods.

Parukutty Nethyar Amma ensured her people never suffered from scarcity of water. She initiated the construction of an artificial pond – Peringavu kulam. Her exquisite ideas on construction of this pond ensured water to all and this pond was never found to be turbid due to the filtering mechanisms installed on all four sides of it. Around 9.5ft was excavated till the level of water and an additional feet was excavated and a layer of grit was laid. The boundaries were constructed with hard laterite stones and pointed using lime. The water was pumped using pumps and ensured water to the whole population of the city there upon. The water supply system was one of her greatest achievements as it was first of its kind in Kerala.

She wanted a memorial in her husband's name and thus almost 1000 acres of land from her property were handed over to build a satellite city- Ramavarma Puram. The central prison of Cochin province was located in Thrippunithura. As she wanted Thrippunithura to be a

temple town, she relocated the prison to 200 acres of land in Ramavarma Puram. She also wanted the prison initially located in front of the Vadakkumnathan temple to be shifted so as to keep the temple premises holy and consequently the prison was demolished and shifted to Ramavarma Puram. Thus the two prisons were merged and later in the future this prison came to be known as the Viyyur Central Prison.

After the death of her husband, Maharajah Rama Varma in 1932, she limited her public participation. Nethyar Amma then went on an extended tour abroad, taking along her grandson. She returned to India and divided her time between Trichur and Coonoor, where she purchased two tea estates and a tea factory and made valid contribution towards the development of Kochi.

CONCLUSION

The early initiatives by the rulers towards trade and commerce sowed seeds for the economical and cultural development of Thrissur. The religious, cultural, historical and archaeological attractions support a strong potential for the development of tourism as well. Thrissur district also possess an excellent inter-city transportation system with good quality arterial roads including National and State highways. Apart from being the cultural nerve center of Kerala, it is also a major academic hub and is home to several educational institutions. It also locates various state-run institutions in the field of art, literature and allied segments. Major industrial sectors include handloom, pottery, tiles, diamond polishing, automobile tyre mouldings, wood and rubber based units, coconut oil extraction, food processing units, etc. Thrissur is also popular for its prominent gold market and is known as the Gold capital of India. It is also an important centre of silk garment trade in Kerala. The city holds the record for the highest number of financial institutions, both in government and private sectors and still locates the headquarters of three major scheduled banks. With the emergence of more developmental projects like the Puthur Zoological Park the city now catches the world's attention.

-Merin Mary Davis , S8 CE

FUTURE OF WASTE TO ENERGY

Conversion of wastes to energy is not a new technology that has developed recently. The most commonly used way to convert waste to energy is incineration, but as always, it has some environmental impacts.

So, nowadays a new technology used to convert the Municipal Solid Wastes (MSW) to energy is through Gasification. Incineration literally means, to render to ash. Incineration uses MSW as a fuel, burning it with high volume of air to form carbon dioxide and heat. In a waste to energy plant that uses incineration, three hot gases are used to make steam which is then used to generate electricity. On the other hand, gasification converts MSW to a usable synthesis gas or simply syngas. It is the production of this syngas that makes gasification so different from incineration.

Instead of producing heat and electricity, as in incineration, syngas produced in gasification can be turned into higher value commercial products such as transportation fuels, chemicals, fertilizers, and it could even substitute natural gas.

On average, conventional waste to energy plants that use mass burn incineration can convert one tonne of MSW to about 550 kWh of electricity. With gasification technology, one tonne of MSW can be used to produce upto 1000 kWh of electricity.

One of the important advantages of gasification is that syngas can be cleaned of contaminants prior to its use eliminating many of the types of after-the-fact emission control system required in incineration plants. The clean gas can be used in engines of turbines to generate electricity or further processed to produce hydrogen, substitute natural gas, chemicals, fertilizers or transportation fuels. The ash produced from gasification is also different from that produced in an incinerator. In gasification, the ash flow is in a molten form where it is quench-cooled forming a glassy, non-leachable slag that can be used for making cement, roofing shingles, as an asphalt filler or for sandblasting.

As you see, gasification is more considerable than the currently using process of incineration. So, the future of waste conversion into energy is gradually turning to gasification. In many countries, such as the US, gasification plants are already under development and incineration plants are facing a decline. This new technology is indubitably a breakthrough in the field of waste management.

-Thaniya Jose ,S8 CE

CONSTRUCTION EXOSKELETON

An exoskeleton is a form of the robotic invention that made its debut in the civil era during the year 2019. The exoskeleton is a metal framework fitted with motorized muscles to multiply the wearer's strength. Also called exosuits, robotic suits metal framework somewhat mirror the wearer's internal skeletal structure. They can be either passive that is it can be used without calculators, motors and batteries to help with lifting or hauling or they can be active which use actuators to aid in these activities. Passive systems are more used in construction and manufacturing industries, as the suits are less expensive and actuators are not necessary to release the exoskeleton user of a payload or a body weight.

There are several types of exoskeleton specifically assistant construction workers. We have classified these suits based on the area of the body support. Power gloves, arm and shoulder support and back support are some of the examples. Power gloves fit around the hands of workers to improve the dexterity of those who experience weakness or other issues with grasping tools and materials. Arm and shoulder support is ideal for overhead tasks like drilling, cutting and grinding

Back support is a type of exosuits typically fit around workers shoulder, back and waist to reduce stress on the back from lifting a heavy object whole bodysuit. These suits provide support throughout the body to minimize strain, maximize productivity and enhance strength.

Exosuits augment human motion to allow more lifting strength and for improved production on repetitive tasks like squatting, bending or walking. These machines aim to reduce accumulated strain gained from prolonged activities throughout the workday. They help to reduce the weight by distributing evenly and reduce strain on different parts of the body. This can lead to a decreased risk of long term injuries for construction workers. Workers using construction exoskeleton experience less fatigue and can complete more work due to decreased strain and increase productivity. Powered or unpowered suits are used in the construction industry in great numbers.

Santhwana , S8 CE

WHAT IS " CLIMATE ENGINEERING"?

To restrict global warming and its hazardous effects, technology has merged innovation and science, and successfully developed the concept of climate engineering. In recent years, global warming has been a grave topic among policymakers, environmentalists and scientists until the concept of climate engineering was introduced.

Climate Engineering commonly referred to as geoengineering is a thoughtful attempt of intervention in the Earths climate scheme. Furthermore, climate engineering is categorised into two more technologies namely solar radiation management and carbon dioxide removal. Geoengineering along with a conjecture array of technologies is launched with a vision to manipulate the interior global climate and prevent the adverse effect of climate change in the future. The introduction of climate engineering stands third in the line of potential options to limit global warming, that is after mitigation and adaptation. However, it is not sure whether climate engineering will complement or destabilize mitigation.

Climate Engineering so far:

To date, no large scale climatic engineering projects have been executed and the proposed scheme has remained inside the laboratories and restricted to computer modelling. Concerns and controversies were removed whenever any attempts were made to move the mighty concept to real-world experimentation. Climate engineering is not a replacement for emission control but is an accompanying strategy and has been reported to have kept scientists winded in the fear of sudden climate change.

Proposed No-exhaustive strategies of Climate Engineering:

The proposed technologies might target different climate systems and is inclusive of varying costs, mechanics and feasibilities. The impacts can be both diverse as well as societal which may again vary on different scales.

Solar Radiation Management : SRM is a projected concept of reducing

sunlight or diverting the sunlight away from the earth which can be done by raising the reflectivity of atmosphere. SRM is aimed to reduce the quantity of heat trapped which is a contribution of the green house gases. With the assistance of SRM, a layer of responsible reflective particles will be deployed in the earth's atmosphere.

Bottom line: Solar Radiation Management is not deployed to decrease the greenhouse gas concentrations and hence cannot be looked upon to address problems which are fostered by carbon dioxide like ocean acidification.

Carbon dioxide Removal: CDR is a conventional concept of eliminating the greenhouse gases from the earth's surface or atmosphere. Methods can include absorbing or storing carbon from the atmosphere, by adopting certain technological methods or formulating natural structures to do so, example oceans. Techniques like tree planting, carbon air capture, confiscating carbon and also creation of biochair are in the process of deployment.

Risks and Challenges accompanying Climate Engineering

Climate Engineering has been a topic of debate for both its positive and negative possibilities.A bunch of questions arise as climate engineering has been confined to only laboratory and desk studies and few small degree field research based on SRM and CDR techniques .Various risks and challenges accompanying climate engineering are:-

i)Cost: Since the mighty atmosphere comes into picture, cost is one of the primary concerns as doubts on feasibility of deployment and development of both CDR and SRM technologies arises.The estimated cost required for climate engineering is yet to be published. However, a rough figure of hundreds of millions of dollar is said to be the average cost per year for climate engineering.

ii)Inadequate answer to CO2 emissions: Ocean acidification which is caused by CO2 still doesn't have a complete solution as climate engineering is only capable of resolving global warming and removing greenhouse gases.

iii)Defense purposes: Depending upon the economic structure of several states and their capability to fund the projects,military can seek to weaponise the climate engineering techniques.If climate engineering is perfected to be a good measure, then it can be misused to bring famines and droughts to the country at war.

iv) External factors: The physical impacts of climate engineering are both intentional and unintentional, depending upon several factors like water availability, security, food production, energy and biodiversity in a particular state or country. Due to incompetency in some states to deploy, research and fund

the climate engineering project can cause hindrances in application of the project as a whole.

The Verdict

The complexity and uncertainties revolving around the concept of climate engineering are numerous and there are several other factors which could hinder the full scale implementation of the project. Also, limited knowledge on climate control, technological immaturity and inadequate costs also reduce the rate of imple

mentation of climate engineering over a large scale. Critical global discussions, major environmental and cultural issues needs to cross all level of governance in order to determine or address the issues of climate engineering. To conclude, the proposal of climate engineering is a brilliant concept leaving aside its repercussions and after effects. In the coming years, climate engineering can be implemented with advancement in technology and science.

Aswathy S Menon
S8 CE

A FULLY DISMOUNTABLE STADIUM IN THE FIFA WORLD CUP HISTORY

The most innovative of all sustainable designs is coming to life on the Doha Corniche and West Bay skyline. The stadium features a bold and visionary design concept unique to any World Cup stadium ever made. Built using modular building blocks, recycled shipping containers, each containing removable seats, concession stands, lavatories and other fundamental stadium elements, Ras Abu Aboud Stadium combines tournament experience and legacy planning in a revolutionary way to create a unique venue.While the other seven Qatar 2022 venues have been built with permanent foundations, the vision for Ras Abu Aboud is a temporary structure that not only provides a world-class venue for football's showpiece event but an innovative blueprint in making new stadiums – and sporting mega-events – sustainable. This will be achieved in legacy mode when the venue's building blocks are dismantled and repurposed for future sporting and non-sporting projects in Qatar and overseas.The stadium's clever modular design also means that fewer building materials are required in its construction. This keeps costs down and reduces the duration of construction. Elements such as the cooling system that is being installed in other Qatar 2022 venues will not be required at Ras Abu Aboud, as its seaside location offers a natural cool breeze off the Gulf. Stadium designer Fenwick Iribarren Architects' vision was inspired by the city's maritime history when it incorporated colourful prefabricated shipping containers. Even the installation of 974 containers in the venue serves as a symbol of Qatar, as the number represents the country's international dialling code.The stadium sets new benchmarks and offers an important guide to staging sporting competitionnns that are more sustainable and legacy-driven. More importantly, it opens the door for countries around the world to consider opportunities of hosting sporting events that were previously beyond their means of realising or achieving.

- Sona Bose,S6 CE

THE EIFFEL TOWER AT A GLANCE

The Eiffel Tower is a wrought-iron lattice tower on the Champ de Mars in Paris, France. It is named after the engineer Gustave Eiffel, whose company designed and built the tower.

Locally nicknamed "La dame de fer" (French for "Iron Lady"), it was constructed from 1887 to 1889 as the entrance to the 1889 World's Fair and was initially criticised by some of France's leading artists and intellectuals for its design, but it has become a global cultural icon of France and one of the most recognisable structures in the world. The Eiffel Tower is the most-visited paid monument in the world; 6.91 million people ascended it in 2015.

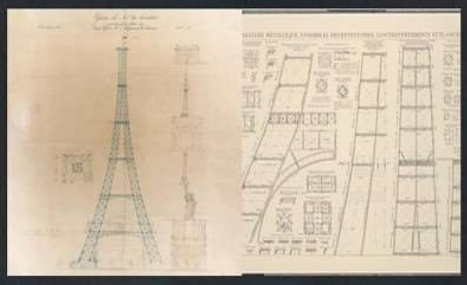
Design - 18,038 metallic parts
5,300 workshop designs
50 engineers and designers

The construction schedule

Works kick-off 26th January 1887 , Start of the pillars' mounting 1st July 1887 ,First floor achievement 1st April 1888, Second floor achievement 14th August 1888, Top and assembly achievement 31st March 1889

The wager was to "study the possibility of erecting an iron tower on the Champ-de-Mars with a square base, , 125 metres across and 300 metres tall". Selected from among 107 projects, it was that of Gustave Eiffel, an entrepreneur, Maurice Koechlin and Emile Nouguier, both engineers, and Stephen Sauvestre, an architect, that was accepted.

The blueprints



The following blueprints are copies of Gustave Eiffel's originals, taken from the book La Tour de 300 meters, Ed. Lemercier, Paris 1900

The assembly of the supports began on July 1, 1887 and was completed twenty-two months later.

All the elements were prepared in Eiffel's factory located at Levallois-Perret on the outskirts of Paris. Each of the 18,000 piecesThe tower was assembled using wooden scaffolding and small steam cranes mounted onto the tower itself.

The assembly of the first level was achieved by the use of twelve temporary wooden scaffolds, 30 metres high, and four larger scaffolds of 40 metres each.

"Sand boxes" and hydraulic jacks - re-

replaced after use by permanent wedges - allowed the metal girders to be positioned to an accuracy of one millimeter.

An object of discord, desire and fascination, the Eiffel Tower never fails to impress. Enriched by a history full of new developments, here you can discover all of its key information

Since the 1980s, the monument has regularly been renovated, restored and adapted for an evergrowing public.Over the decades, the Eiffel Tower has seen remarkable achievements, extraordinary light shows, and prestigious visitors. A mythical and audacious site, it has always inspired artists and challenges.It is the stage for numerous events of international significance. As France's symbol in the world, and the showcase of Paris, today it welcomes almost 7 million visitors a year (around 75% of whom are foreigners), making it the most visited monument that you have to pay for in the world.

A universal Tower of Babel, almost 300 million visitors regardless of age or origin have come from all over the planet to see it since its opening in 1889. For the Universal Exhibition of 1889, four majestic wooden pavilions designed by Stephen Sauvestre decked the platform on the first floor. Each restaurant could seat 500 people. Even before the end of its construction, the Tower was already at the heart of much debate. Enveloped in criticism from the biggest names in the world of Art and Literature, the Tower managed to stand its ground and achieve the success it deserved.

Other satirists pushed the violent diatribe even further, hurling insults like : "this truly tragic street lamp" (Léon Bloy), "this belfry skeleton" (Paul Verlaine), "this mast of iron gymnasium apparatus, incomplete, confused and deformed" (François Coppée).

Once the Tower was finished the criticism burnt itself out in the presence of the completed masterpiece, and in the light of the enormous popular success with which it was greeted. It received two million visitors during the World's Fair of 1889.

- Annmary Baby, S6 CE

CONCRETE 3D PRINTING

Everything in the world today is becoming automated. We can see its reflections in the field of Civil Engineering. One of them is 'concrete 3d printing technology. This technology can complete constructions in a short period which makes it more attractive. The concrete 3D printing technology is a 'Ready-to-Implement Methodology' with no lead time on manufacturing, and is touted to offer advantages including - reduction in overall construction cost and time, brings down the carbon footprint, higher productivity of labour, and utilization of eco-friendly materials.

In recent years concrete 3D printing has been continuously gaining popularity in the field of civil engineering. Concrete is one of the most consumed material in the world. Concrete is a composite material which composed of water, binding substance, and aggregates.Also concrete is an inexpensive, and very popular, material. However, concrete 3D printers themselves are expensive. Nonetheless, there are several advantages of using a concrete 3D printer rather than traditional construction methods. It is faster, cheaper, safer, and more efficient. A concrete 3D printer not only produces minimal waste but also significantly reduces the number of workers needed on site. Moreover, using a concrete 3D printer, construction can be completed to a significantly higher degree of resilience and superior quality.

In July 2020, Belgian company KampC unveiled the first two story house printed on site in Europe. The house is eight meters tall and has a floor area of 90 square meters . The 2 storey house was printed by a machine called the BOD 2 from a company called COBOD which is short for 'Construction of Buildings on Demand'. The house was built in just 15 days of print time. The structure of the house was printed in one piece by Bod2 and while the printing process is fully autonomous.

Human labours are still needed to set up, monitor and assist the Bod2.

Tvasta Manufacturing Solutions, a start-up founded by alumni of IIT Madras, has made India's first 3D-printed house. They built a single-storey house of area 600 square feet within five days. They had developed their own material mix, which is an extrudable concrete consisting of cement, sand, geopolymers, and fibres. Though concrete is the primary material typically used in construction projects, it cannot be recycled and requires a lot of energy to mix and transport. So, the team's effort to use technology to print the house using ordinary Portland cement can "overcome the pitfalls of conventional construction. This advancement will open doors for all kinds of research and development in the construction world

3D printing works on additive technology. A standard concrete 3D printer functions very similarly to a standard FDM printer. This is primarily because both systems are based on material extrusion. First, a digital 3D model is created using 3D modelling software. The model is then sliced into several 2D layers. The quality of the 3-D Object depends on the thickness of the 2D layers. Layer information is transmitted to the printer in a special format called G-code. The G-Code then controls the printhead which deposits material pumped from a cement mixer in layers until the final piece is produced. A typical concrete 3D printer is designed to additively manufacture parts through material extrusion, consisting of a robotic arm, with one end attached to the printhead, and the other end is connected to either a gantry or crane-like robotic arm system. Depending on the type of concrete 3D printer, its design, ability, and process vary. The build volume, print resolution, practicality, and efficiency of a concrete 3D printer will vary depending on its system, technology, manufacturer, etc.

It primarily consists of a gantry-style overhead structure that supports the printer. This kind of concrete 3D printer is well suited for commercial construction projects. They are rarely used for smaller projects, due to the sheer size and associated limited portability. The technical effort required to set up and dismantle is higher than the Robotic Arm-based Concrete 3d Printer. This type of concrete 3D printer works based on a cartesian coordination system consisting of x, y, and z axes. These axes are defined by the rails and beams of the supporting structure. The x-axis corresponds to the length of the rails that move the printer forwards and backwards, while the y-axis corresponds to the length of the rail carrying the printhead and connecting the pillars, which in turn are defined by the z-axis and move up and down.

ICON's 3D printer, the Vulcan II, is an example of a Gantry Concrete 3D printer. It has a printing capacity of approximately 2000 square feet The printer is 2.5 meters tall and 8.5 meters wide. The machine exclusively uses ICON's proprietary concrete material known as Lavacrete. The Vulcan II is expensive, priced at just under $250'000. But additive manufacturing significantly reduces construction costs, as such many construction companies will opt to hire the machine instead. In 2019, ICON's printer successfully printed a house for under $4000, in just 24 hours. The Vulcan features intuitive tablet-based controls, remote monitoring and support, onboard LED lighting for printing at night or during low-light conditions, and a custom software suite ensur-

A mechanized or robotic arm concrete 3D printer is supported by a crane-like structure and it has 6 degrees of freedom. This means that it is possible to create more complex geometries and higher resolution parts when compared to a gantry-based machine. This type of 3D printer also has the added benefit of increased portability and compactness and is thus easier to both set up and take down. These had limited build volumes and were thus restricted to constructing smaller parts. But recent advances have enabled the development of machines with larger build volumes, rivalling that of gantry printers. Robotic arm printers tend to be more expensive than gantry systems

In 2018, a Russian startup named Apis Cor made build a 400-square-foot-home being built from scratch using their proprietary robotic arm concrete 3D printer. The project was completed in just 24 hours in Moscow and cost just $10,000. Two years later the company again successfully constructed the world's largest 3D printed building in Dubai with their proprietary additive manufacturing technology.

Every technology has some merits and demerits. By comparing with conventional construction methods, 3d printing technology has a lot of benefits. This modern technology can minimize construction waste and makes it more cost-effective. Also, we can optimize the consumption of material so it makes a revolutionary change in the construction field. It will increase the ability to design a large variety of complex structures and also helps to customize houses and buildings. However, along with these advantages, it has some drawbacks also. This method of construction requires less manpower to operate. As a result, it leads to unemployment in construction phase.

In the end, I conclude that the coming years are going to witness a great revolution in the construction sector. The advancements in concrete 3D Printing will overcome all limitations and makes it possible to build a house at less cost, less manpower, in a matter of days

- Bestin biju, S6 CE

ENERGY EFFICIENCY AND
THERMAL PROTECTION OF NORMAL BUILDING

Energy efficiency simply means using less energy to perform the same task – that is, eliminating energy waste. The energy efficiency of a building is the extent to which the energy consumption per square metre of the floor area of the building measures up to established energy consumption benchmarks for that particular type of building under defined climatic conditions. An energy-efficient house has much higher insulation R-values than required by most local building codes. An R-value is the ability of a material to resist heat transfer, and the lower the value, the faster the heat loss. Energy efficiency is using technology that requires less energy to perform the same function. For example, usage of a LED or CFL bulb than an incandescent light bulb to produce the same amount of light. Grid-tied solar photovoltaic (PV) panels currently provide the most cost-effective form of renewable energy for a zero energy home. They can power all the energy needs of a home.

Thermal insulation is an important technology to reduce energy consumption in buildings by preventing heat gain or loss through the building envelope.

Adding insulation to buildings can greatly increase comfort and reduce energy costs and greenhouse gas emissions. Climatic conditions influence the appropriate level and type of insulation. The most economical time to install insulation is during construction. The most common insulation materials are fibreglass, cellulose and foam. Home insulation types include any of the above materials in the form of loose-fill, batts, rolls, and foam board. Energy-efficient insulation types are fibreglass and cellulose insulation. Cavity walls give better thermal insulation than solid walls. It is because the space provided between two leaves of cavity walls is full of air and reduces heat transmission into the building from outside. Economically they are cheaper than solid walls.

Hence a good thermally insulated and energy-efficient building is of great importance in the present scenario and also for the future.

-Vaishnav ,S6 CE

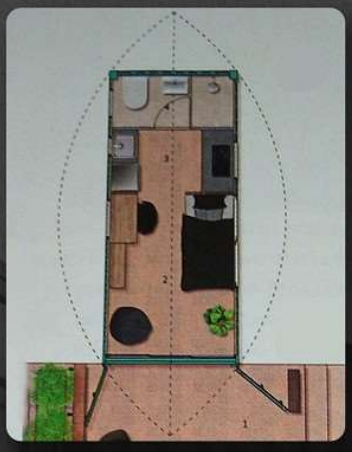
A CONTAINER HOME IN IJK

A small house to spend the vacations in Kerala that too in a very small budget, that was the dream of Preji, a Mumbai based keralite. And the dream came true with the help of the architects of Walls N Voids atelier. This one of a kind 300sqft house is located in kattungachira. A 20x8 feet standard container was brought from kochi and its cost including shipping was 1.1 lakh. In order to place the container 4 concrete legs was set up. These legs extended 2.5 ft upwards and 1.5 ft downwards from the ground level. The interior has approximately 200 sq.ft and a 100 sq.ft sit out was extended form the front portion of the container.

Teracotta tiles were used for flooring. After insulating, the walls of the container was covered with cement board, this helped in reducing the temperature inside. Toughened glass door is provided in the front and outside this is the iron door of the container. On one side there is the bed and after a small partition, the kitchen. On the other side there is the study area, refrigerator etc. The bathroom is approximately of 8x3.5 ft. A 300 litre tank is placed on top of the container and water is pumped to the tank form the well. Solar panel provided on top of the sit out is more than enough for the working of refrigerator, fan, tv, lights etc.

The total construction cost including the solar panel is 6.5 lakhs. Even though it was difficult to find workers during the pandemic, the work was completed in 5 months.

Front View



Plan

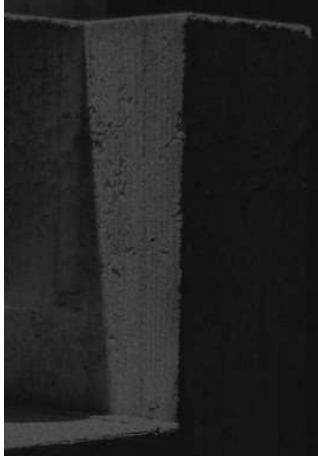
Sona Bose S6, CE

SELF-HEALING CONCRETE

Concrete is one of the most widely used construction material and has a high tendency to form cracks. These cracks lead to a significant reduction in concrete service life and high replacement costs. Although it is not possible to prevent crack formation, various types of techniques used to hear the cracks. Some of the current concrete treatment methods such as the application of chemicals and polymers are sources of health and environmental risks and more importantly, they are effective only for a short period of time. Thus treatment methods that are environment friendly and long-lasting are in high demand.

Dr Henk Jankers, a microbiologist who specialises in the behaviour of bacteria in the environment, has developed self-healing concrete. Jankers has worked closely with civil and structural engineers to learn about the properties of concrete and steel reinforcement and develop the concrete. Self-healing concrete is a product that will biologically produce limestone to heal cracks that appear on the surface of concrete structures. Specially selected types of bacteria genus Bacillus, along with a calcium-based nutrient known as calcium lactate and nitrogen and phosphorous are added to the ingredients of the concrete when it is being mixed. These self-healing agents can lie dormant within the concrete for up to 200 years.

However, when a concrete structure is damaged and water starts to seep through the cracks that appear in the concrete, the spores of the bacteria germinate in contact with the water and nutrients. Having been activated the bacteria start to feed on the calcium lactate. As the bacteria feeds, oxygen



is consumed and the soluble calcium lactate is converted to insoluble limestone. The limestone solidifies on the cracked surface, thereby sealing it up. It mimics the process by which bone fracture in the human body is naturally healed by osteoblast cells that mineralize to reform the bones.

The bacterial spores and calcium lactate based nutrients are introduced to the concrete within separate expanded clay pellets 2-4mm wide, which ensures that the agents will not be activated during the cement-mixing process. Only when cracks open up the pellets and incoming water brings the calcium lactate into contact with the bacteria and these become activated. Testing has shown that when water seeps into the concrete, the bacteria germinate and multiply quickly. They convert the nutrients into limestone within seven days in the laboratory. Outside, at a lower temperature, the process takes several weeks.

The consumption of oxygen during the bacterial conversion of calcium lactate to limestone has an additional advantage. Oxygen is an essential element in the process of corrosion of steel and when the bacterial activity has consumed it all, it increases the durability of steel-reinforced concrete constructions. It decreases the maintenance of concrete.

Two main obstacles that need to overcome if self-healing concrete is to transform concrete construction in the next decade. The first issue is that clay palettes holding the self-healing agent's comprise twenty per cent of the volume of the concrete. The clay is much weaker than normal aggregate and this weakens the concrete by twenty-five per cent and significantly reduces its compressive strength. The second disadvantage is the cost of self-healing concrete is about double that of conventional concrete.

The self-healing techniques that are being investigated include bacteria concrete, shape memory polymer tendons and flow networks. The addition of microcapsules containing sodium silicate etc. What was very evident from these techniques is that the different self-healing techniques will be best suited to different applications. Further researches are being conducted to develop perfect self-healing concrete which will be a milestone in the civil engineering field.

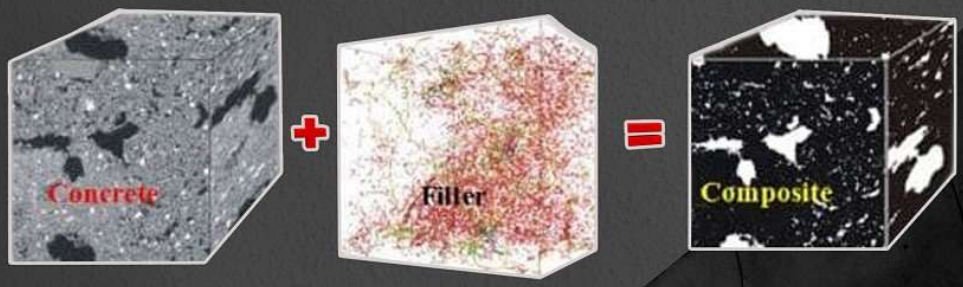
-Samyuktha Vijay , S6 CE

SELF-SENSING CONCRETE

Nowadays, A middle speedy urbanisation and world temperature change the necessity of Self-sensing concrete technology. it's developed by land developers for multiple reasons. The aspiration towards a structurally accountable business guarantees to push a wider use of self-sensing concrete in returning years. Concrete is that the second most used artifact within the world after water. The matter is that over time the fabric becomes weaker. As a response, researchers and designers square measure developing self-sensing concrete that not solely will increase longevity however conjointly the strength of the fabric.

Self-sensing concrete has the potential to sense the conditions within it and environmental modification as well as stress (or force), strain (or deformation), crack, damage, temperature, and wetness through incorporating purposeful fillers or sensing element. It will be classified into intrinsic self-sensing concrete and non-intrinsic self-sensing concrete. The physical parameters of self-sensing concrete can modification because it is subjected to external force, deformation, or environmental action, so presenting sensing capability. The self-sensing concrete has nice potential within the fields of structural health observation, traffic detection, and border/military security. The composition of self-sensing concrete is analogous to traditional concrete with the addition of purposeful fillers. The purposeful fillers used will be steel fibres, carbon fibres or carbon nanotubes, nickel powder, etc. The presence of purposeful fibres provides the concrete to possess a semiconductive network that provides values for ohmic resistance, electrical phenomenon, and electric resistance once the current is allowed to taste it.

The self-sensing property of good concrete relies on the arrangement of the purposeful fibres within the concrete. The purposeful fibres square measure well distributed within the concrete matrix-supported that the concrete matrix includes a distinctive and intensive semiconductive network. When the concrete is subjected to any type of deformation or stress, the conductive network is disturbed. It changes the electrical parameters of the concrete matrix. The electrical parameters studied are capacitance, ohmic resistance, and resistivity of the fabric. The measure of those electrical parameters determines the strain, stress,



Structure of Self-Sensing Concrete at Macroscopic Level.

and harm caused to the concrete beneath static and dynamic conditions. The strain is measured by deciding the ohmic resistance. The self-sensing concrete incorporates an advanced structure. it's a point in time and multiscale composite. The self-sensing concrete structure at the microscopic level doesn't have a solid structure. The figure below shows the structure of self-sensing concrete at the macroscopical level. it's a mix of two-phase material, within which the practical fillers are distributed within the concrete matrix.

The self-sensing concrete will observe even tiny structural flaws. This application is critical in finding out the interior conditions of the structures subjected to earthquakes. Composite and standard concrete structures bear cracks once subjected to sudden loadings. Embedding sensors among the structures typically judge these sudden deformations. A sensing element is extremely big-ticket and prices even a lot for its installation. With the expansion of the good buildings market, the applying of good concrete is inspired. Its primary operation is to observe minor cracks and stunning the progress of cracks to create a lot of reliable combines. Good concrete needs tons of external force to bend even in smaller amounts. It will store a lot of energy before fracture.

Shihas M S
S6 Civil

IMPORTANCE OF
TRANSPORT ENGINEERING ECONOMICS

Transportation plays a key role in economic development even in advanced economies. The progression of economies from agrarian to industrial to use a simplified example- requires that each nation specializes in the goods and services that it can produce most efficiently. As a nation whose economy moves away from a focus on agriculture, India still does not stop using agricultural products. Instead, it needs to be able to trade the industrial goods it produces for the other products it needs. International trade makes this possible. And transportation infrastructure makes international trade possible. When production is done by the nation with a labour force that excels in the skill set best suited to that product, specialization of labour occurs.

Transport services and the associated infrastructure can also give a state a comparative advantage over other nations' economies. An example of a comparative advantage in transport can be found in the US rail freight industry.

In the UK, they have low bridges and cannot stack the containers at all on a train. American trains can be stacked two containers high because they have no height restrictions or low bridges. Therefore, they have a comparative advantage over other countries who have low bridges. The US has an absolute advantage over countries that have no railways, such as most of Africa and South America.

We need to consider whether transport and logistics service expansion is supply or demand led.

Why is this important? Because we are interested in causation. We need to know whether logistics is responding to growth that is instigated by our actions and which is creating transport capacity, or whether it is reacting to growth that we have not influenced.Supply-led is when growth is instigated by your actions.

More transport and logistics assets and infrastructure investment by both government, as well as firms, will create more capacity to generate products or services, which will create more demand. More transport, logistics and the related infrastructure lead to economic development. Increasing quality and transport facilities lead to access to more markets, and efficient transport is cheaper, so more transport is used.

Demand-led growth is not so controllable. Investment in overall economic development leads to demand for transport, so the demand is from consumers. Demand must initially exist to make it worthwhile to provide transport services, whereas supply-led growth is about expanding transport nd logistics capacity.Demand can arise from two sources: revealed and latent demand. Revealed demand is based on actual movements of goods. Latent demand is the potential demand that cannot be satisfied due to inadequate supplies.

What worked to move the economics from agrarian to industrial applies to the more complicated choices and location decisions that businesses and nations make in today's increasingly globalized marketplace. This economic study differs from existing research on the topic of infrastructure and economy, because it examines the overall contribution from wellperforming infrastructure rather than the impact on growth that results from spending due to the initial investment. The problem of causation: does investment in infrastructure cause growth? Or does growth cause investment in infrastructure? This is well identified in the literature on this base.

India's transport sector is large and diverse. It caters to the needs of 1.1 billion people. In 2007, the sector contributed about 5.5% of the nation's GDP, with road transportation contributing the lion's share. Good physical connectivity in the urban and rural areas is essential for economic growth. Since the early 1990s, India's growing economy has witnessed a rise in demand for transport infrastructure and services. Roads are the most dominant mode of transportation in India today. It carries about 85% of the country's passenger traffic and more than 60% of its freight.

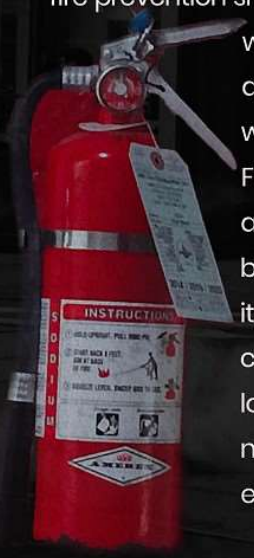
Tiya Victor,S4 CE

FIRE SAFETY IN CONSTRUCTION

During construction there are many aspects that we need to consider. Fire safety is one of the most important area that needs careful planning. Fire is a perilous-threat on any construction site. Hence, Fire safety is essentially important during the construction process as well as after the construction.

Fire safety is the set of practices intended to reduce the destruction caused by fire. Fire safety measures include those that are intended to prevent the ignition of an uncontrolled fire, and those that are used to limit the development and effects of a fire after it ensues.

During construction workers may have chemicals on site that are combustible and wind can be present frequently. So fire prevention should be a main concern when planning and managing the construction work.



Fire safety policies apply at the construction of the building and throughout its operating life. Building codes are enacted by local, sub-national, or national government to ensure features such as adequate fire exits, as well as construction details including fire stops, fire rated doors, windows and walls. Fire safety is also an objective of electrical field, which is coded to prevent overheating of wiring or equipment and to protect from ignition by electrical faults. Local authorities charged with fire safety may conduct regular inspections for such items as useable fire exit and proper exit , functional fire extinguishers of the correct type in accessible places, and proper storage and handling of flammable materials.

Owners and managers of a building may implement additional fire policies, for example, an industrial site may designate and train particular employees as their official fire fighting force. Managers must ensure that buildings comply with fire evacuation regulations, and that building features such as spray fireproofing remains undamaged. Fire policies may be in place to dictate training and awareness of occupants and users of the building to avoid obvious mistakes, such as the propping open of fire doors. Building institutions such as schools and offices may conduct fire drills at regular intervals throughout the year.

Naturally, the very first step in fire resistant construction is to maximize the use of non-combustible materials. Load-bearing walls should be thicker in section to act as fire barriers for a considerable time. Asbestos cement board, metal lath and plaster are often used in the ceiling framework to strengthen its fire resistance. A flat roof is always better from the fire safety point of view. This is due to the fact that fire spreads more rapidly on a sloped surface in case of unfavourable wind conditions.

Fire resistant mortar is used in plastering all types of walls, such as bearing, non-bearing and partition walls. Doing so increases the fire resistivity of any structure up to a certain degree. Asbestos cement board also known as asbestos insulating board offers huge advantage in developing fire safety in any construction.

Modern world have adopted many ways to tackle the problem with fire. Strict following of rules and regular checking helps increase fire safety. In construction, engineers are dealing with the life of many, so regardless of the field of work, it ought to offer proper fire safety. Careful planning and execution is the best way to meet the required standard and provide the best facilities to people.

Nayanthara M. M.
S4 CE

ONE YEAR OF DEMOLISHED MEMORIES

It has been a year since it happened for the first time in our country that left so many people stranded. More than one apartment complexes were demolished following the supreme court verdict for the violation of Coastal Regulation Zone (CRZ) norms. After all their legal battle, the supreme court issued an ultimatum to demolish the four high rise buildings by implosion in Maradu municipality in Ernakulam district of Kerala on January 11th and 12th. The buildings were H20 Holy Faith, Alfa Serene, Jain Coral Cove and Golden Kayaloram.

"Maradu flat flattened"; not only Malayalees but people from all across the county turned to google to watch this historic moment. More than half a lakh people came to bear witness to this day via google on the 11th of January 2020, Saturday only. The demolition was such a hot topic of discussion that it soon became trending no. 5 among the most browsed topics on Google.

Under the guidance of Fort Kochi sub-collector Snehil Kumar, a joint meeting was directed and they picked up Edifice Engineering centered at Mumbai and Vijay Steel located at Chennai for demolishing the apartments. An expert engineer namely Sharath B Sarwate from Indore had a detailed checking on the flats. He illustrated that the age of the building is important in the demolition process and he also added that it is better to tilt the building and break. Holy faith building was demolished on the 11th of January 2020, Saturday at 11:17 AM, which was followed by the Alfa Serene twin towers, Block A and B, that fell to the ground at 11:43 AM IST. Followed by that on the 12th of January 2020, one of the oldest apartment complexes in Maradu, the Golden Kayaloram was also demolished at 2:30 PM. On the very same day, at 11:30 AM, the 55-metres high, Jain Coral Cove was razed to the ground as well.

Emulsions, shock tube detonators, detonating fuse and electric detonators were the devices and explosives that were employed for the historic demolition of the aforementioned apartment complexes. The said detonators were kept at a distance of 100 metres from the explosives strapped to the building. These detonators initiate the blast when electric current flows through its internal circuit, provided the

detonators are electric. The explosive emulsions used were SuperPower 90, a product of leading exporter and manufacturer of explosives situated at Nagpur. Ammonium Nitrate was also used, which is such an efficient explosive, that it could be used for explosive purposes even when it is suspended in a liquid, i.e., in its emulsion form.

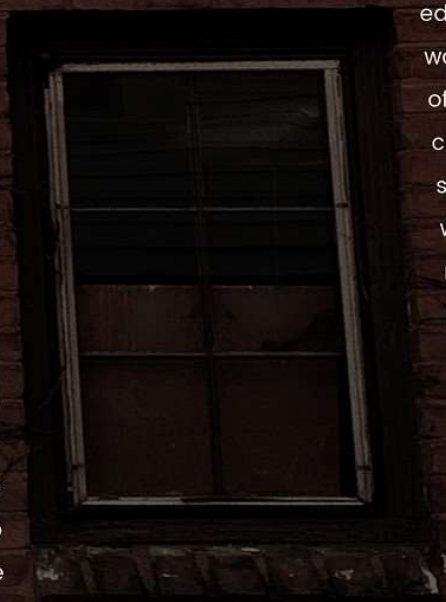
Non-electric detonators or shock tubes were the principal explosion initiating devices used. In these detonators, hollow plastic tubes were employed instead of electric wires for creating the initial spark that triggers the whole blast. The fuse component, which is a narrow, flexible plastic tube, gets filled with pentaerythritol tetranitrate (penthrite), thus activating the explosion. On the other hand, electric detonators used, allowed such precise timing of intervals in between consecutive explosions, owing to which the explosions in various floors of the building were carried out within a limit of mere milliseconds. These detonators, as mentioned earlier, were kept in a cubicle at a safe distance of 100 metres and they were made to activate at a pre-determined time by allowing electric current to pass through its internal circuit with the help of a manual switch.

Safety was surely given paramount importance, and the precautions taken by the police officials and concerning authorities were painstakingly faultless before and after this intricate process. To ensure that no threats are posed, a series of sirens were employed, three of which were made to go off prior to and

the last one just after the demolition. With the first siren blaring, the nearby lake was patrolled thoroughly ensuring no activities were engaged in the backwaters and in the vicinity proximal to the building, and with the second siren the official were signalled to undertake required traffic control protocols. The third one sounded just one minute before the detonators went off, and the last one took to air two minutes after the implosion, with the debris still settling and the dust still suspended in the Cochin air.

Building Implosion, also referred to as controlled explosion technique, which is used to demolish multistoreyed buildings within a fraction of seconds, was the technique adopted in Maradu. The first phase involved inspection of the building plan of the apartment to be demolished. This helped in understanding how the building was constructed and where the main pillars are located. In the second phase, the team of demolition experts inspected the building. The structure of each floor of the building was scrutinised and notes were documented. In the third phase, the demolition plan was formulated. This plan was prepared by considering the building plan, an inspection of the building and

take-aways from earlier demolitions. In some cases, a 3-D model was developed and a virtual simulation of the demolition was run for checking what would happen during the actual process. Implosion is a technique that refers to collapsing something inwards, in contrast to explosion which means blowing outwards. The method of implosion is used to demolish a building without affecting the nearby buildings. This is based on the principle that if the main pillars of a building are removed, it would collapse on its own. If the upper floors are heavier, when they come crashing down, the lower floors would be destroyed subsequently. The explosion would be carried out on several floors to weaken the main pillars. Once the pillars are destroyed, the building would collapse due to the gravitational force. Determining the time of the detonation is a crucial part of the building implosion method. The impact caused on the earth when the building comes crashing down and the resulting tremors would depend on this timing. A building implosion carried out with extreme caution would trigger less than 25 millimetres of tremors per second on earth. Several small explosions would be carried out to demolish one building. The first explosions would be on the main pillar of the ground floor. This is to give maximum power in the fall. The pillars for the first demolition are decided based on where the building rubble should fall. When one pillar is demolished, the part of the building supported by that particular pillar would start falling. The speed of the falling rubble would increase by 10 meters per second due to the self weight of structural components. While falling, other pillars or beams can turn out to be obstacles in the path of falling. To avoid that, the explosion would be timed for different floors. Like this, the building would fall on to its base on its own. It is also possible to change the timings of the detonators and make the building fall towards a particular side at the desired angle. Before demolition, walls, windows, doors and iron frames of the flats have been removed. Only the pillars and beams were remaining. It has been ensured that there were no hazardous objects left in the building.



The team from IIT Chennai made the provisions to assess the impact of the explosion.

A total of ten accelerometers and 12 jio phones were placed within a radius of 200 metres. Marine coastal police ensured security in the backwater area and 800 policemen were deployed near each flat. After the demolition, a team of structural engineers inspected the nearby buildings for any damage. The shops were built on an experimental basis by prompt enterprises who acquired the concrete remains of the demolished flats. The concrete remains, which added up to a few loads, were transferred to a crusher and made into construction products such as metals having dimensions of three by fourth and one by fourth, and M sand.

The 'Maradu' incident is a warning to those who break the law in the construction industry. The presumptuous nature of transgressors that stems from the assumption that it is not practical for the authorities to take action after the completion of construction, even if it is done in violation of the rules, has hereby met its end. The Maradu flat demolition shows that no matter how densely populated an area is, the buildings can be demolished with a precisely controlled explosion.

-Reshma T.M.,S4 CE

SUSTAINABLE ENGINEERING
AND ECO FRIENDLY CONSTRUCTION PRACTICES

Sustainable engineering is the process of designing or operating systems such that they use energy and resources sustainably, in other words, at a rate that does not compromise the natural environment, or the ability of future generations to meet their own needs.

Every engineering discipline is engaged in sustainable design, employing numerous initiatives, especially life cycle analysis (LCA), pollution prevention, Design for the Environment (DfE), Design for Disassembly (DfD), and Design for Recycling (DfR). These are replacing or at least changing pollution control paradigms. For example, concept of a "cap and trade" has been tested and works well for some pollutants. This is a system where companies are allowed to place a "bubble" over a whole manufacturing complex or trade pollution credits with other companies in their industry instead of a "stack-by-stack"and "pipe-by-pipe" approach, i.e. the so-called "command and control" approach. Such policy and regulatory innovations call for some improved technology based approaches as well as better quality-based approaches, such as levelling out the pollutant loadings and using less expensive technologies to remove the first large bulk of pollutants, followed by higher operation and maintenance (O&M) technologies for the more difficult to treat stacks and pipes. But, the net effect can be a greater reduction of pollutant emissions and effluents than treating each stack or pipe as an independent entity. This is a foundation for most sustainable design approaches, i.e., conducting a life-cycle analysis, prioritizing the most important problems, and matching the technologies and operations to adress them. The problems will vary by size (e.g. pollutant loading), difficulty in treating, and feasibility. The most intractable problems are often those that are small but very expensive and difficult to treat, i.e., less feasible. Of course, as with all paradigm shifts, expectations must be managed from both a technical and an operational perspective. Historically, sustainability considerations have been approached by engineers as constraints on their designs. For example, hazardous substances generated by a manufacturing process were dealt with as a waste stream that must be contained and treated. The hazardous waste production had to be constraine d by

selecting certain manufacturing types, increasing waste handling facilities, and if these did not entirely do the job, limiting rates of production. Green engineering recognizes that these processes are often inefficient economically and environmentally, calling for a comprehensive, systematic life cycle approach. Green engineering attempts to achieve four goals.

Environment friendly processes, or environmental-friendly processes (also referred to as eco-friendly, nature-friendly, and green), are sustainability and marketing terms referring to goods and services, laws, guidelines and policies that claim reduced, minimal, or no harm upon ecosystems or the environment. Companies use these ambiguous terms to promote goods and services, sometimes with additional, more specific certifications, such as ecolabels. Their overuse can be referred to as greenwashing. To ensure the successful meeting of Sustainable Development Goals (SDGs), companies are advised to employ environmental friendly processes in their production. Specifically, Sustainable Development Goal 12 measures 11 targets and 13 indicators "to ensure sustainable consumption and production patterns".

A Eco-friendly Connection with Nature, the International Organization for Standardization has developed ISO 14020 and ISO 14024 to establish principles and procedures for environmental labels and declarations

that certifiers and eco-labellers should follow. In particular, these standards relate to the avoidance of financial conflicts of interest, the use of sound scientific methods and accepted test procedures, and openness and transparency in the setting of standards.

-Jibin Joy K, S4 CE

INNOVATIVE BUILDING MATERIALS

Digital revolution is gaining momentum in the construction industry where we have drones, virtual reality, BIM Services, project management, and more. Technology advancement is going next level where development in concrete and other construction materials have been changing rapidly.

Many of the building materials in today's construction era have an adverse impact on the environment. With these issues, many engineers have researched about adopting new building material that can be an alternative and used in the construction to isolate its impact on construction time.

Due to a rise in climate change and humanity's environmental effect, carbon reduction is becoming a major concern for the coming years. Many owners, engineers, and designers have taken steps to reduce greenhouse gas emissions with their products and research methods.

All the building material that laid a negative impact on the environment has led to sustainable construction innovations that will reduce the production of carbon dioxide, along with improving the building's durability and reduce energy bills.

Some innovative construction materials can aid in revolutionizing the construction industry and help us build a sustainable future of projects.

Translucent Wood

It can be used to make windows, and solar panels. Due to its cheap source value, it can aid the projects to be benefitted from a lesser cost of the resource.

Transparent wood and replacing lignin with polymer makes it eco-friendly products against glass and plastic. When used for residential building purposes it can reduce artificial lightning due to renewable properties.

Hydroceramic Bricks

Hydroceramic is a new material that is made out of clay and hydrogel to bring out cooling effect on the building interiors, which reduces the indoor temperature by 6 degree Celsius. Hydrogel absorbs up to 500 times its weight that reduces the temperature during summer.

Cigarette Butt Bricks

The impact of cigarette produced and consumed is adverse on the environment. Millions of cigarette butt wastes are collected annually. Materials that

have chromium and nickel in soil harm nature. Bricks made out of cigarette butt wastes are lighter, energy-efficient, and aids in reducing cigarette butt wastes. When you infuse cigarette waste in fired-clay bricks, it not only helps in reducing pollution but also makes the material durable and energy efficient that help save cost and time.

3D Printed Bioplastics

Another innovation that is prevailing in the construction industry is the use of bioplastic furniture that is made out of waste materials such as wood chips, gypsum, and oat bran, with a fungus named as Ganoderma lucidum. This fungus can shatter waste products and leave a strong structural material called as bioplastic materials. Bioplastic furniture would help with waste reduction and sustainability.

Hydrophobic Cement

Hydrophobic Cement is also known as Illuminating cement or Light Generating cement. This type of new material is where the cement traps the light from the sun during the day and releases in the night, creating a glowing surface that will influence the road construction. It creates a glowing surface effect that at times, makes the builder saves on lightning cost. This cement is more durable than conventional cement and lasts long, like more than 30 years. It can be used in swimming pools and parking lots.

Spider Silk

Artificial spider silk is believed to be 340 times stronger and more robust than steel and is going to be the coming trend of sustainable material the next generation construction industry would be using ahead. 3D printing with spider silk has changed the game of construction projects being conducted and creates a product made from water, silica, and cellulose, which makes it tougher than the steel and Kevlar components.

Self-Healing Concrete

Concrete is one such material that is porous and easily damageable, which is a major concern going on in the construction industry. But due to the emergence of an innovative building material known as selfhealing concrete, consisting of living spores and water capsules in mixed concrete, which can heal the cracks with its properties. Often it is used for tunnels, bridges, and buildings to save cost and maintain it.

Programmable Cement

Water and chemical resistance can be achieved by programmable cement in the construction projects. It is designed in a way to achieve less porous and more chemically resistant shapes. Concrete may cause a problem in building construction, but programmable cement is durable and lasts longer.

Building Construction Material is going to bring a lot of innovations in the traditional method of processing the cement or making bricks for the building of components. Hence, any BIM (Building Information Modelling) Services company would take the building material that can lower the cost and be more efficient to conserve energy and streamline the building process.

Materials used in today's world are more durable and lasts longer than traditional cement or bricks. All the innovative building materials are now focusing on the sustainability aspect of conserving the environment and on the health of occupants.

-Anns Prince, S4 CE

EARTHQUAKE ENGINEERING

Earthquake and impact engineering are essential disciplines affecting the lives and properties of citizens in many parts of the world. They aim to understand the impact of loading on buildings and other structures and infrastructures, avoiding future disasters. It highlights the areas of earthquake hazard mitigation, preparedness and recovery germane to practicing engineers.

In any given year, the world can expect 18 earthquakes. If the epicenter is in a populated area, an earthquake of this magnitude can cause devastating damage. The study of earthquake hazards and what can be done to reduce the associated risks is a field known as Earthquake Engineering. Earthquake engineering draws on the disciplines of structural engineering, structural dynamics, seismology, materials engineering, geotechnical engineering, risk and decision analysis, and probability and reliability theory to holistically address infrastructure performance in an uncertain seismic future.

The focus of our Earthquake Engineering practice is two-fold, post-earthquake investigations of causative mechanisms resulting in structural damage, failure, or collapse; and earthquake planning and risk mitigation, which includes identification, quantification, and mitigation of risk through optimal repair strategies, performance based upgrades, and customized solutions. Earthquake engineers offer support to property owners, insurance and legal communities, and government agencies, both in the aftermath of earthquakes and in pre-earthquake planning and mitigation.

An important aspect of earthquake engineering is investigation of damaged structures after a seismic event. The Northridge Earthquake caused more damage and provided many opportunities for earthquake engineer to study why some buildings suffered more than others. It is by studying earthquake damage, as well as structures that were not damaged, that engineers learn how to design and build more reliable structures. Since it is not economically feasible to construct buildings that will not be damaged in major earthquakes ,

some damage is expected. However, sometimes engineers discover design or construction features that make a building more susceptible to earthquake damage. For instance, the engineer may have underestimated earthquake loads, or the contractor may not have built important components correctly. Occasionally, engineers discover surprising damage mechanisms like the cracking of welded steel connections observed after the Northridge Earthquake. This is a potentially serious damage mode that affects some of the most modern, well designed, and well constructed buildings.

Other aspects of earthquake engineering include understanding the nature of hazards, such as understanding the chances of a large earthquake, and assessing whether the site soil will amplify the shaking or if liquefaction will weaken the site soils. Reliable assessment of potential structural damage that will result from ground shaking often requires sophisticated computer simulation.

Earthquake engineering, which has arisen over the last hundred years, is a field devoted to mitigating earthquake hazards. Earthquake engineers investigate the reasons why infrastructure and buildings fail during earthquakes and then apply their knowledge to planning, designing, constructing, and managing earthquake resistant structures and facilities.

-Malavika C.A., S4 CE

SKY BUS TECHNOLOGY

The Sky Bus technology offered by Konkan Railway Corporation re-defines the thinking and planning for urban transport being an eco-friendly transport system revolutionizing urban life. It is a patented technology developed for the new millennium and will cause a great shift in urban transportation all over the world. Being an indigenous technology, it will place India at the forefront of the Rapid Transit Industry all over the world. Also, it will be a great console for a transportation solution, which is financially viable, synergizing well proven existing cutting technologies.gravida. Risus commodo viverra maecenas accumsan lacus vel facilisis. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Quis ipsum suspendisse ultrices gravida. Risus commodo viverra maecenas accumsan lacus vel facilisis.

Moreover, it is better than metros in case of construction expenses since it will be cheaper to run compared to metro stations. Also, it can take a sharp turn which cannot be imagined in a standard gauge metro. Sky Bus is based on the concept of Sky Wheels presented in 1989 at the World Congress for Railway Research by Mr. B Rajaram, Managing Director of KRCL at Bologna University, Italy. The sky bus uses prefabricated latest construction technologies, which save time and money resulting in easy execution of the project in busy urban areas without disturbing the existing traffic pattern. All these structural engineering methods are well - proven. They have IT tools for economical communication and control. The 3 phase asynchronous AC electrical motor used for the propulsion of sky buses is also well proven and widely used abroad as well as in India. The most precious asset in growing urban areas is land. After its allocation for residential and commercial purposes hardly 6 % to a maximum of 18 % of land in cities forms roadways. The roadways once laid almost remain constant and indeed may be effectively reduced by uncontrolled encroachments.

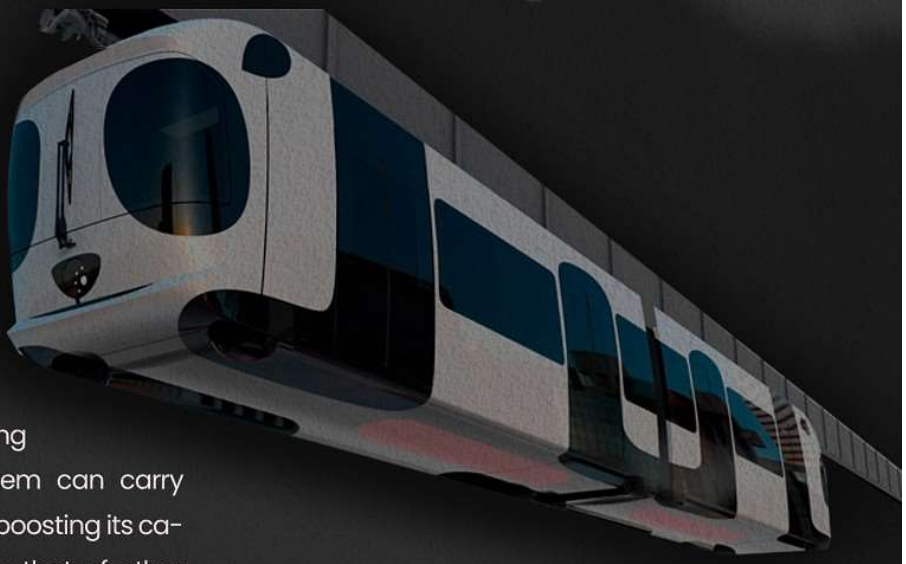
With the physical constraint on road area in the wake of increasing population, the intensity of loads and traffic volumes on the roads increase. As more and more people from different habitats try to converge on to the central business district, the road is left with no capacity to improvise and handle the excess traffic, leading to congestion. Roads take one exactly to

the point where one wants to go. But the capacity is limited in terms of passengers per hour that can be handled, considering speed limits and lane width limitations. The fixed structure at meters height above road level provides the support and guidance for powered bogies which can run at 100 kmph, with the coach shells suspended below, carry passengers in air conditioned comfort, can follow existing road routes while existing traffic on roads continues.

Aesthetic, and eco-friendly, the Sky Bus is protected against derailment, toppling or collision - by design as well as by construction, hence is safer than the existing rail based system. At the cost of Rs. 50 Crore per km. in India, the system is noise-free and pollution-free with a capacity to transport 36000 passengers per hour (pph), scalable to 72,000 pph as required. With no signaling and having no points and crossings, it is a unique mass-transit system that can be put up within two years in any crowded & congested city.

In addition to moving people, the Sky Bus system can carry standard 20 ft. containers, boosting its capacity utilization to double that of other existing systems. It operates along existing roadways and within municipal limits. Unlike conventional mass transit systems, Sky Bus needs smaller stations about 50 mt. long Stations are available at every 1 km. It is a natural footbridge across the road. From up line to down line the station provides natural access, which is easy. Service is available every 30 seconds or 1 minute, which means virtually no waiting time for passengers.Totally automated without drivers, access control is electronic by prepaid cards being swiped in. Stations act only as an access facility, and not as a passenger holding area. Overall, it will be a hundred times safer than the normal bus.

-ATHULYA C SABURAJ, S4 CE



INTERESTING CIVIL ENGINEERING STRUCTURES

Palm Island

In 2001, there was nothing off the coast of Dubai except for shallow gulf water. However, the city was becoming over-populated quickly. To solve this problem, local real estate conglomerate Nakheel Properties used GPS precision to shape 94 million cubic metres of sand into a 17-frond palm tree-shaped island. Sixteen quarries throughout the UAE were dredged for rock, which forms a breakwater around the island to protect it from wind and waves. It took a decade for Palm Jumeirah to be fully completed, although residents began moving to the island in 2008. The trunk is made up of luxury hotels and malls and the fronds are lined with mansions. A six-lane underwater tunnel allows people to travel to the island from the mainland and the Middle East's first monorail travels the length of the island. Two other islands are currently under construction

Kansai Airport

Located in Osaka, Japan, this was the first airport to be built on an artificial island. The project was created as a solution to overcrowding, as the city was too small to fit an airport on the mainland. One of the biggest challenges engineers faced was the clay found in the seafloor they intended to build on – it retains too much water to be a reliable foundation. To combat this, engineers utilised 1.2 million sea drains, a new technique used for sea-based stabilisation. Tubes were driven deep within the clay, filled with millions of tons of sand, and then removed. The columns of sand still act as drains within the clay, to stop the foundation becoming saturated with moisture and moving. 48,000 stacked upon the stabilised seabed, with each one weighing 181 tonnes. Nearby mountains were excavated and approximately 161 million cubic tonnes of earth were poured into the gaps. It took three years for the seawall and base to be completed, before construction could begin on the airport itself.

The airport is an architectural wonder, built to reduce environmental impact and save money – blade-like deflectors line the ceiling, channelling air through the building and acting as a passive air conditioning system. Completed in 1994, it took three years and saw over 10,000 workers contribute to its construction. The island is 4 kilometres by 2.5 kilometres and became the world's most expensive civil engineering project, costing US $20 billion

Tokyo Sky Tree

Engineers tasked with the construction of the 634 metre high-rise building faced many challenges while building Japan's tallest building. They had to take into account not only the typhoons that strike Tokyo every summer, but also potential earthquakes as it is built on an active fault. Structurally, it features a reinforced concrete central column, which is separate from the outside steel frame – an adaptation of the design often seen in pagoda temples. Traditional Japanese building technique shinbashira was utilised, which sees the central column reduce sway by counterbalancing seismic waves.

Channel Tunnel

This 50.5 kilometre tunnel features the longest undersea portion in the world, coming in at 37.9 kilometres. Completed in 1994 after six years of construction, it cost approximately US $21 billion and required much problem solving from engineers. For example, they needed to ensure passenger safety, in case of a fire within the tunnel. So, engineers constructed a third, smaller tunnel in between the two full-sided tunnels, to act as an escape route during emergencies. There are also a number of passages that allow the trains to cross-over onto the other track. Eleven boring machines were used to dig the tunnel, collectively weighing over 12,000 tonnes – each one was as long as two football pitches.

Construction saw collaboration between British and French engineers, who had a competition to see who could reach the centre of the tunnel first: the British won. 13,000 workers were employed at the height of construction, and 10 people were killed while building the tunnel. The average depth of the tunnel is 50 metres below sea level, with the lowest point 75 metres down. The Channel Tunnel was included in the American Society of Civil Engineer's "Seven Wonders of the Modern World" list..

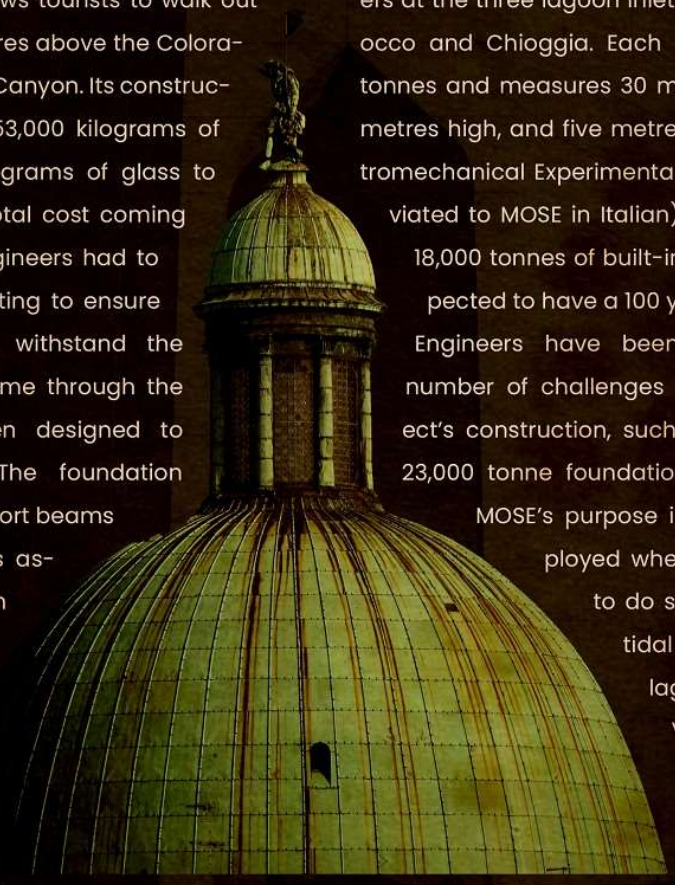
Panama Canal

The French originally started this project back in 1880; however they failed because of poor design and high mortality from diseases such as yellow fever and malaria. So, the US took over and redesigned the endeavour in 1904, officially completing the project in 1914. Measuring 77 kilometres, this canal connects the Pacific and Atlantic oceans, allowing easier passage for ships. There were many challenges for engineers to overcome, such as the landmass being above mean sea level due to mountainous terrain, dense jungle, removing rocks and soil, and differ-

ences in tides. The Europeans believed canals should be built at sea level; however this would have involved much excavation and cost millions of dollars more. The Americans decided to utilise locks, which would raise and lower ships into the placid waters of the canal. Dams and spillways meant the water in this canal was better regulated than a strait in between two bodies of water, mitigating the issues brought on by the differences in tides

Grand Canyan Skywalk

This glass bridge allows tourists to walk out onto thin air, 1219 metres above the Colorado River in the Grand Canyon. Its construction required over 453,000 kilograms of steel and 37,000 kilograms of glass to complete, with the total cost coming to US $40 million. Engineers had to undergo rigorous testing to ensure the structure could withstand the strong winds that come through the canyon; it has been designed to absorb vibrations. The foundation consists of eight support beams and the skywalk was assembled onsite, with the welding of the bridge taking four months to complete. A manipulator was designed to lift the 46 glass panels, each weighing 816 kilograms, into place. Three tuned mass dampers, which were specifically calibrated to meet the wind and weight requirements, were placed the horseshoe frame to make the bridge structurally sound.



Venice Tide Barrier

Despite construction beginning in 2003, this barrier is not yet complete. However the last of the giant floodgates designed to protect Venice from rising sea levels were built by a Croatian engineering firm earlier this year. In total there will be 78 gates forming four barriers at the three lagoon inlets of Lido, Malamocco and Chioggia. Each gate weighs 272 tonnes and measures 30 metres wide by 20 metres high, and five metres thick. The Electromechanical Experimental Module (abbreviated to MOSE in Italian) consists of over 18,000 tonnes of built-in steel, and is expected to have a 100 year lifespan.

Engineers have been faced with a number of challenges during this project's construction, such as lowering the 23,000 tonne foundation into a lagoon. MOSE's purpose is to only be deployed when it is necessary to do so; it will not stop tidal flow into the lagoon or cut Venice off from the ocean. The moveable barriers will sit beneath the lagoons surface during calm weather, allowing the gates to fill with water. However,

when the tide rises, the water will be pumped out of the gates and replaced with air, so they rise to the surface and form a barrier capable of stopping water surges as high as 2.7 metres. This project will cost approximately US $6.5 billion in total.

Bailong Elevator

The tallest elevator in the world is located in the side of a cliff in China's Wulingyuan scenic area. Constructed between 1999 and 2002, the Bailong Elevator's shafts and tunnels were carved from a quartz sandstone column in the heritage-listed area, despite protests from environmentalists. Made of glass, it offers dizzying the top of a mountain range. 154 metres of the lift are embedded into the column, and the remaining 172 metres are set into exposed steel and other components. The journey takes just under two minutes, with lift cars running at three metres per second, taking up to 50 passengers at one time. Earthquake detectors are fitted into each car, to allow for a quick evacuation in case of an emergency.

Aleena Joshy
S4 CE

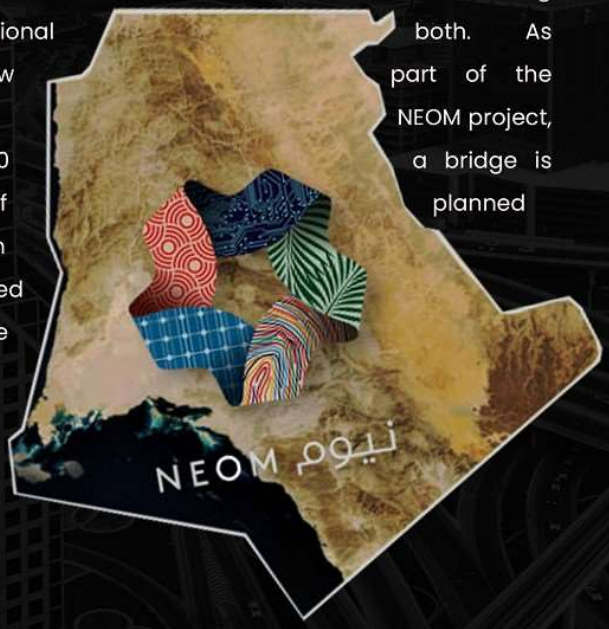
NEOM, THE LINE AND OTHER WINDOWS TO THE FUTURE

In January of this year, the Saudi Arabian crown prince announced an immense new development project that is supposed to set a blueprint for his country and the world. He announced that the Kingdom will build a city, that stretches along a single 100 mile long line. The linear city is part of a larger development project planned by the Saudi Arabian government: Saudi Vision 2030.

The economy of Saudi Arabia is heavily dependent on the oil industry, which historically has ensured growth and led to the country now being the 18th largest economy in the world by GDP. Saudi Arabia has the second largest oil reserves on the planet. While the oil industry is the strength of the country, it has also been recognized that there is a risk in this dependency. Therefore, the government is trying to diversify the economy. As part of the Saudi Vision 2030 initiative, the country is investing primarily in large infrastructure projects, education, scientific research, the healthcare system and the tourism sector. The goal is to pave the way for new industries, in which the focus is primarily on future technologies, such as renewable power. And this is a development that can be seen across the Arabian Peninsula, with nations starting ambitious future programs. Even if these initiatives differ from one another in terms of scope and objectives, whatthey have in common is that they include structural investments that are designed to expand the regional economy to new areas.

The Vision 2030 initiative of Saudi Arabiam was announced in April 2016. The project is pushed forward by Crown Prince and minister of defence, Bin Salman is already regarded as the de facto leader of the country. The Line City is part of perhaps the biggest project of this larger campaign initiated by him, NEOM (derived from the Greek word 'neo' meaning new and the Arabic word 'mostaqbal' meaning future).

NEOM, which is a 500 billion dollar planned smart city, is being built in the Tabuk Province of Saudi Arabia. Here, the government has set up a zone for the new city. The area is located on the Gulf of Aqaba and and the Red Sea, with the Straits of Tiran connecting both. As part of the NEOM project, a bridge is planned



across the Tiran Strait. This would create a land connection from North Africa to the Arabian Peninsula, bypassing Israel.

Construction on some of the first projects have already started since NEOM was announced. In the first phase, NEOM BAY is being developed, which should lay the foundation for further development. Some hotel complexes as well as luxurious apartments were created. And in 2019, the newly built NEOM BAY airport was inaugurated, which enables a direct connection from the capital of Saudi Arabia, Riyadh. But the largest project in NEOM at the moment, is not intended for the general public. It is a huge park complex consisting of several palaces for the Saudi king, the crown prince and his brothers, as well as several villas for other members of the royal family.

With the announcement of The Line earlier in 2021, for the first time, plans have been presented for how the actual city in NEOM will look like. This city concept should bring a number of advantages which bin Salman hopes will make it the city of the future. Spanning 170 kilometres, this city will be starting from the desert and stretching through the desert and mountains, and finally ending in the region's upper valley. It will be a belt of individual city modules connected by infrastructure. These modules will have a futuristic urban design composed of three layers. The p destrian layer will be a continuous landscape of buildings surrounded by green areas with no cars and no streets. This will ensure a green living environment with no pollution or traffic accidents. It will be webbed with walkways, bike paths and sustainable food production facilities. Its design will ensure that all daily needs are within a five minute walk. Beneath all this will be the service layer- a hidden layer of infrastructure that will transport goods enable technology and power the city. Lastly on the bottom, will be the spine layer, which will have tunnels with high speed trains, a metro and AI controlled passenger vehicles. This transportation will allow the entire city to be traversed within only 20 minutes.

The Line will be split among four distinct ecologies, with an average temperature that is 10 degrees Celsius cooler than the rest of Saudi Arabia. The first will be the coastal sector, which will serve as a tourist destination with breath taking beaches, islands and nature reserves. The second will be the coastal desert, which will serve as a major transport crossroads for the city and a solar generation centre. The third will be the mountains, which will be the least developed and populated, but will serve as a centre for hiking, climbing and extreme sports. Lastly, the upper valley will have wind turbines and supply chains and logistics connections to the nearby city of Tabuk and the rest of Saudi Arabia.

NEOM

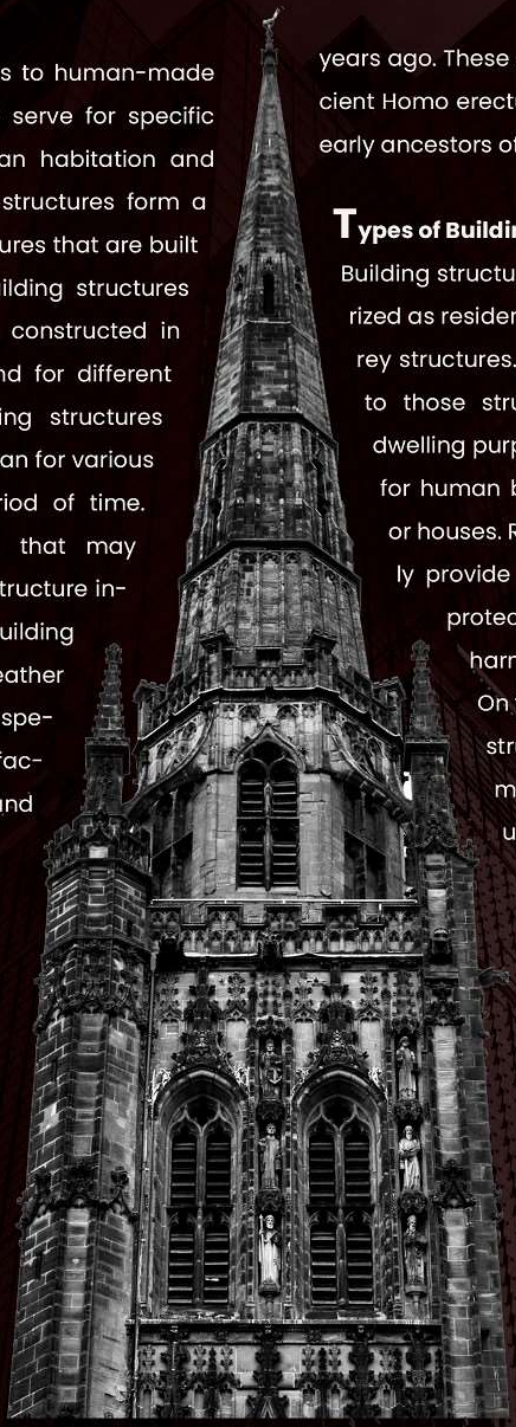
The Line will be monitored by Artificial Intelligence. According to NEOM 90 percent of available data will be utilized by AI to improve transport efficiency, cleanliness, security, water management and many other systems. The city's water will come from desalination plants. In January 2020, NEOM signed a deal with a UK- based company, Solar Water Plc, to build the world's first ever Solar Dome Desalination Plant. Finally, the city will be environmentally friendly. It will run entirely on solar panels and wind farms; and its buildings by having lots of plants, will be carbon positive, meaning that they will actually net absorb carbon dioxide. Meanwhile, the city's design will protect 95 percent of the regions nature. When finished, The Line will host 1 million people and will cost 100 to 200 billion US dollars, which is around one-third of neom's total cost. This money will come from the Saudi Arabia Sovereign Wealth Fund along with international investors. The Line will create 380,000 new jobs adding a 180 billion Saudi the world's population and will sit right along one of the world's busiest shipping routes making it a strategic trade hub. Lastly, it will serve as a feat of human technology and engineering, as part of Saudi Arabia's Vision 2030 program. However, despite its grand visions, the project has several issues. First of all, because the city is a long narrow band locations will naturally be further apart. Even with high speed transportation, this is said to be inefficient. In addition, the city will traverse directly through mountains, forcing it to be split in two. Furthermore, some people are concerned about the large amount of AI sensors and face detecting cameras impeding on citizens' privacy. Moreover, with it being so expensive there are concerns that the city will only be accessible to the wealthy, thus increasing inequality. Not to mention many people believe the project is too ambitious. Will one million people really move to a sparsely populated region of desert in northwest Saudi Arabia? On top of all this some believe e that the money could be better spent elsewhere, for example, on improving Saudi Arabia's already existent cities. Lastly, the city will displace thousands of native people. There have already been forced evictions and in April 2020, and an activist was killed, raising humanitarian concerns.

Despite these issues, the construction has already begun in the first quarter of 2021 and will be finished over the coming years. After this, the larger NEOM mega city will rise from the desert. According to NEOM CEO Nadhmi Al-Nasr, the majority of master plans for this larger city will be announced in 2021. If completed, The Line will be a high-tech metropolis, the most expensive planned city in history. It could become a global tourism, technology and trade hub, helping decrease Saudi Arabia's dependence on fossil fuels. Needless to say, if this ambitious project truly happened it would revolutionize urban living once and for all.

-Fathima Mizaj
S4 CE

BUILDING STRUCTURES

Building structures refers to human-made objects that are built to serve for specific purposes, such as human habitation and trading activities. These structures form a division of physical structures that are built through construction. Building structures are often designed and constructed in various shapes, sizes, and for different functions. Various building structures have been adopted by man for various factors over a long period of time. Some of these factors that may define the purpose of a structure include availability of building materials, changes in weather conditions, constructor's specific reasons, aesthetic factors as well as prices of land and building materials.



History of Building Structures

The history of building structures can be dated back to more than five hundred thousand years ago. Historians believe that the first structures, in form of a shelter, were constructed approximately five hundred thousand years ago. These structures were built by ancient Homo erectus who happened to be the early ancestors of the present dayhumans.

Types of Building Structures

Building structures can be broadly categorized as residential structures or multi-storey structures. Residential structures refer to those structures that are used for dwelling purpose. They provide shelter for human beings, for example, homes or houses. Residential structures usually provide humans with security and protection from environmental harm.

On the other hand, multi-storey structures are those that have multiple floors, usually upwards. Most multi-storey structures are used for commercial purposes. These structures intend to increase the area covered by the structure, thereby making good use of the scarce land resources. They target at maximum utilization of the available land. A good example of present day multi-storey structures are skyscrapers

built in various large cities of the United States of America, some areas of the United Arab Emirates, and other parts of the world.

Creation of Building Structures

Building structures are often created through efficient design and construction. This process involves the use of a team of professionals, usually architectures, building and construction engineers, who work together to design and construct the structures in accordance to the structural plan.

The size of this team of professionals, who come up with the building structures, will depend on various

factors, such as the size of the structure, complexity of the structural plan, purpose of the structure, and the availability of construction resources.

If the structure is more complex, then additional building professionals may be required. These include real estate developers, quantity surveyors, interior designers, construction site managers, and contractors, who provide contractors, auxiliary services, such as security systems installation, installation of telecommunication systems and fire protection systems. For building structures constructed for commercial purposes, marketing agents and facility managers may be required to sell it, and to take responsibility for the structure.

It is also important to note that the construction of all building structures is regulated by specific laws and regulations. These laws, regulations and building requirements vary from one country to another. However, there are internationally recognized rules that control the construction of all structures; for example, tall buildings with more than five floors are required to have lifts or escalators that help people move in the structure. Additionally, there should be a fire protection system to ensure security of users of such structures.

Drawbacks of Building Structures

Most building structures face different weaknesses, ranging from financial constraints during construction and maintenance to damages by natural calamities and terrorist activities. Similarly, they may face political influence, for instance, formulation of stringent laws and regulations that govern and control the putting up of such structures.

Environmental Impact on Building Structures

Building structures can be severely affected by changes in the environment. Certain natural catastrophes, such as earthquake and hur-

ricanes, also have negative impacts on such structures. For examples, most structures were severely damaged by earthquakes in Japan in the quarter of 2011. Strong winds and
hurricanes usually bring down building structures. Excessive rains can also destroy building structures.

Sustainability of Building Structures

Building structures must be built in a manner that would facilitate their resistance to external forces, such as wind, rain and ground shakes. Construction engineers must be able to understand the capability of building structures to withstand such forces; for example, it is important to note that tall buildings may be more severely affected by earthquakes than short buildings.
Adequate precautions must be taken during the design and construction of building structures. The building professionals must ensure that structures must be put up in accordance to the set standards. Additionally, adequate resources must be used during construction of the building
structures.

Conclusion

In conclusion, it is important for construction professionals to ensure that the structures they've built are strong enough to sustain the negative impacts of nature and human activities. This can be achieved through adherence to building and construction laws. Similarly, they must ensure that high quality materials are used during construction of such structures, for example, strong steel metal, high quality cement, and preserved wood or timber. The safety of the building structures should be paramount and
be given the highest consideration.

Husna Habeeb

S4 CE

CONCRETE SHEAR WALL
STRENGTH AND PROPERTIES

A shear wall is a structural member used to resist lateral forces i.e., forces acting parallel to the plane of the wall. For slender walls where the bending deformation is more, shear walls resist the loads by means of cantilever action and for short walls, where the shear deformation is more, it resists the loads by truss action.

These walls are more important in seismically active zones because during earthquakes, shear forces on the structure increases. Shear walls should have more strength and stiffness. When a building has a story without shear walls, or with poorly placed shear walls, it is known as a soft-story building. Shear walls provide adequate strength and stiffness to control lateral displacements. Shear walls perform dual action that is they are lateral as well as gravity load-bearing elements.

Concrete Shear Wall

Concrete shear wall buildings are usually regular in plan and elevation. Shear wall buildings are commonly used for residential purposes and can house from 100 to 500 people per building. Horizontal and vertical distributed reinforcement (ratio 0.25%) is required for all shear walls

Strength of Shear Walls

The strength of a wall system depends on many factors including the strength of sheathing; type, size, and spacing of fasteners, panel aspect ratio (ratio of long to the short dimension of the shear panel); and strength of studs. Because of these variables, the design strength of shear walls is usually based on tests of full height specimens.

Shear walls that are perforated with openings are called coupled walls. These walls act as isolated cantilevered walls connected by coupling beams (also called spandrel beams or lintels) designed for bending and shear effects.

Aadhilakshmi P. P.
S2 CE

ROLE OF CIVIL ENGINEERS IN THE COVID ERA

Although covid decrement was all about social distancing it required a great team play of doctors, nurses, scientists and policemen in the frontline. But at the same time, it is not less worthy to know what the civil engineers did, what they can do or what they should do in these hardships.

The spiralling corona cases had put an unusual load on hospitals, but these engineers were able to build massive emergency infirmaries such as Leishenshan, SVP, Huoshenshan etc. in less than 13 days! This helped to isolate the victims especially from other patients of the hospitals who have very minimal chance of recovery when infected. On the other hand, the immigrants who got stuck at different locations were thankful to these engineers for the fast built relief camps.

We know that lane closures and traffic disruptions are major challenges in construction. Well since lockdowns vanished the busy roads and heavy crowds it is these engineers who can make the most use of it to fix infrastructures such as roads, bridges, footpaths, sewage canals and water pipelines. Many reports reveal that our best defence against illness and diseases are sustainable wash systems which we have yet to accomplish. Also, , WHO warns us that without urgent action we are heading for a post-antibiotic era in which common infections and minor injuries could once again kill us.

The world is now smaller and more connected which makes viruses spread faster than ever. However, there is no limit to the innumerous solutions we engineers can create.

Alphymol V J , S2 CE


EUNOIA
Behold the galaxies in our minds.
Eunoia
literally translates to beautiful thinking.
It also connotes the possession of well
balanced mind, which exhibits goodwill
and kindness.
THE REVIVAL MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING
CCE IJK

Bloom

The visit of autumn made it shed, gave it sorrow
With a pain but a gain gave its new life.
The laburnum of its height waits for a shower
for it comes-the festive mood of joy
of beauty, it goes to hands, shiner for hours.

The life like rain sheds its sorrow of hard tears,
rolls over of hot and spicy like summer
Sheds of the sorrow of its life
And waits with hope,
For a spring to cherish with heights
There shines the beauty of life.

No gains without pains
No happiness without gains
No life waits for pains, and
No wood burn for fire.

Hope ends if no moment to cherish
Dream end if no hopes to work out
Track to success comes from will,
Will to path comes from joy, and,
Joy to greatness comes to sparkle.

Sun to shine
Earth to rotate
Moon for night light, Stars to twinke
There waits glooms to bloom

- Ashwathy S Menon, S8 CE

കാത്തിരിപ്പ്

ചാറ്റൽ മഴയത്തു നനഞ്ഞു നിൽക്കെ
വെയിലേറ്റു എൻ മനം വാടി നില്ക്കെ
മഴവില്ലിൻ ഏഴു വർണങ്ങൾ
എൻ മനസ്സിന്റെ കോണിൽ നിറഞ്ഞു നിന്നു
ഒരു മുകിലാകുമെൻ മനസ്സിന്നരികിൽ
ആ സപ്തവർണക്കൊടി തെളിഞ്ഞുനിന്നു
ഒരിക്കലും മായരുതേയെന്നു മോഹിച്ചു
എങ്കിലും ഒരുനാളെൻ മഴവില്ല്
എൻ മിഴിതൻ മുന്നിൽ മങ്ങിനിന്നു.
ഏതു കടലിനും തിരയെന്നപോലെ
ഏതു വെയിലിനും തണലെന്നപോലെ
എൻ മനസ്സിന്റെ മഴവില്ല് തെളിയുമെന്ന്
ആശിച്ചുപോയി ഞാൻ ഒരു നിമിഷം
എങ്ങു നിന്നോ ഒരു വേനൽ
കനവിലും കരുതാതെ കടന്നു വന്നു
പറയാതെ അറിയാതെ എൻ മഴവിൽക്കൊടി
പതിയെ പതിയെ മാഞ്ഞുപോയി
എൻ മനസ്സിന്റെ അരികിൽ നിന്നകന്നുപോയി
ഒരു വേളയെൻ മനം വിതുമ്പി നിന്നു
എങ്കിലും പുതുപ്രതീക്ഷകൾ നിറഞ്ഞു നിന്നു
വീണ്ടും ചാറ്റൽ മഴക്കായ് കാത്തിരുന്നു
ആ മഴവില്ലിനായി നോക്കി നിന്നു.

-അശ്വതി എസ് മേനോൻ , S8 CE

WHAT IF

Couldn't sleep, couldn't breathe
What lies ahead is an unsolved mystery.
What if I'm the only one,
What if it's forever. Starting to forget
the feeling of laugh
Oh my love, please!
Bear with me.

I can't watch you die like this
When my heart flickers without a beat
And promises shattering.

Seems like fakeness is the new trend,
Where we're just going the motion playing pretend.
Starting to love the feeling of forlorn

But
What if it's forever,
Which makes my heart weigh, like holding
A lever full of nails.

dress like the sun and the moon But
they still calls me the ugly one.
Why? I ask you why?
Am I the shady one ,
Is it mine, whose face shouldn't seen by any
Well, I wonder
Have anyone seen your heart.

Calling me fake,
For god's sake,
They didn't knew how much I ache
And this, is my stake
So let me wake from this
And give it a shake

Trying to be the phoenix bird
But no one ever taught me how,

Who am I kidding
Even the bird is just an
Egyptian classic!

-Karthika Haridas, S2 CE

WHY CIVIL ENGINEERING?

Hi! I am Elna, a fresher here at Christ College of Engineering, and this is the story behind why I chose to pursue Civil Engineering.

After the much anticipated 10th standard board exams, I was positively certain about choosing bio-math stream for high school, as I was very much concerned about my future. Back then, when people asked me about my dream profession I just said I wanted to become a doctor without bothering to elaborate further, as I myself didn't have a precise explanation behind my choice. The first time I ever really contemplated about my choice was during my high school admissions. As usual when I told my go-to answer to the principal when he asked me about my ambition, I didn't expect a question that challenged me immensely, "Elna, why do want to become a doctor?".

To satiate the questioner I blurted out some grand dialogue from movie I had seen earlier. But that encounter really had me thinking the same: "Why did I want to become a doctor?". Sadly though, I never really reached at an answer myself. But the high school days that followed, really helped me realize the fact that medicine wasn't exactly my cup of tea. When my peers found their passion in biology I had the opposite experience. I was surely not eager to learn biology and the only reason that got me studying it, was my obligation towards the teachers who taught the subject. Hence, I gradually lost my delight in wanting to become a doctor. If not the medical field, then what next? Of course, it is engineering. Due to my interest in mathematics, I thought engineering could be a good option. It was during that time the school decided to provide a carrier guidance session for students by one of the famous carrier Guru. All of us listened to the talk very keenly and somewhere in the middle of the session, he mentioned that "Your goal must be specific" which means for example you shouldn't be simply stating

that I will go for medicine or I will go for engineering instead you should be very specific about what you want to be. Therefore I decided to do a thorough study on the different branches of engineering and their possibilities in the future. When I came to know that all the beautiful and picturesque buildings, houses, dams, roads, etc. are a contribution of civil engineers, my respect towards the word civil engineer itself intensified. And that's how I decided to take civil engineering as my profession. Undoubtedly, civil engineers are going to have a very bright future and I am proud to be a part of it.

-Elna Babu, S2 CE

CHARACTERLESS

There lived a farmer who has a flock of sheep and a dog with a child doggy for looking after the sheep. The little doggy was named Ludo. He played with the little sheep. They used to play together, sleep together and fight together. But whenever they get into a fight the one who gets the blame is Ludo. Even when the fight was started by sheep the one who gets scolded by mother doggy is Ludo. Every time after the fight the mother doggy advises Ludo that "you are stronger and elder so you have to be patient with the sheep because you can harm them seriously. So, even though you are hurt, forgive them". One day, once again there came a serious fight, Ludo lost his control and a sheep was seriously injured. Mother doggy rushed towards the sheep and made the sheep comfortable. And she went to Ludo and slapped him for what he had done without knowing that he was also badly injured. Ludo ran off from home. After a long walk he got an idea. He dressed up as a sheep and returned home so that he could get the care and love from his mother just like the sheep. After he got home no one identified him because he was dressed as a sheep. He started to act like a sheep, eat like a sheep, walk like a sheep, he even changed his favorites to be like a sheep. As days passed, by he gained his mother's much needed attention, love, and care. Years passed by, and while Ludo continued with his act, mother doggy got old. One day, mother doggy got sick and it was her time to go.

Finally, she takes her departure with the last words, "I miss you my son". Ludo was not able to control his tears, and he ran out. He walked without knowing where to go, he couldn't take out the last words of his mother from his head. He felt so depressed. When he came across a river, he saw his reflection, which prodded him to think about himself. He had lost his identity and character. He was confused with his likes and dislikes, his behavior as a dog. He realized that now he is a characterless being, neither a dog nor a sheep. After all these years of acting, he had only lost his character and gained nothing. Not even a single day had passed without having the fear of getting caught. He realized his fault and ran away to nowhere.

Abhiya Davis, S4 CE

"Stop acting and start fighting."

Others might get hurt due to your character, but it can also make someone happy and can lead to a change. It's alright to make sacrifices, but never change your identity or character. So never give up on yourself, and stop acting and sacrificing your character for others' happiness.

മൗനം

പ്രിയമാർന്നൊരാ കാലം
നിനക്കിന്നകലയോ...
മധുവാർന്നൊരോർമ്മതൻ
ചില നിമിഷങ്ങൾ.
ഇന്നകലുകയാണു
മൂകമായി.
യാത്രയായി അവൾ
നിദ്രയും പൂകി.
മാഞ്ഞു പോയി കൂരിരുട്ടിൻ
മറയിലെവിടയോ...
ഏകയായി തിരഞ്ഞു
ഞാൻ ഒരുപാട്
കഴിഞ്ഞിലൊരിക്കലും
നിന്നെയണയാൻ
വിധിയതു ചൊല്ലി
നിനക്കന്യമാണോ
മിഴിയും മിഴിനിലാവും ...
കാലമേ വിട പ്രണയമേ
വിട
മൗനമാർന്നൊരാ മനസ്സും
മൂകമായി യാത്രയാകും ഒരു
നാൾ...
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കാത്തിരിപ്പിന്നാർക്കോ
വേണ്ടി ...
അവളറിയാതകലുകയാണ്
ഇന്നേതോ കിനാവിൽ...

Sarath Babu, S8 CE

ഓർമ്മപ്പെടുത്തൽ

നഷ്ടപെട്ട ബാല്യം

കടലോളമകലെ

തിരിച്ച് കിട്ടില്ലെന്നറിഞ്ഞിട്ടും

വീണ്ടും വല്ലാതെ

മോഹിക്കുന്നു

വാർദ്ധക്യം

ഒരു വിരൽ ദൂരമകലെ

പോകാതിരിക്കാനാവില്ലെന്നറിഞ്ഞിട്ടും

എത്തിടല്ലേ എന്ന് മനസ്സുചൊല്ലിടുന്നു

എങ്കിലും നാഴികകൾ കടന്നെ പോകുന്നു ....

കൗമാരമോ ഈ ചിന്തയിൽ

അറിയാതെ പോയ് മറഞ്ഞിടുന്നു

നേടിയതും നേടാനുള്ളതും

മാത്രമോർക്കുന്ന ഈ വേളയിൽ

ഈ നേരം നേടേണ്ടവ

മറന്നു പോയിടുന്നു

Athulya Suresh, S4 CE


MERAKI
Expression of the soul.
Meraki
This is a word that modern Greeks often
use to describe doing something with soul,
creativity, or love when you put "something of yourself"
into what you're doing, whatever it may be.
THE REVIVAL MAGAZINE BY THE DEPARTMENT OF CIVIL ENGINEERING
CCE IJK

-Aswathy P.P , S2 CE

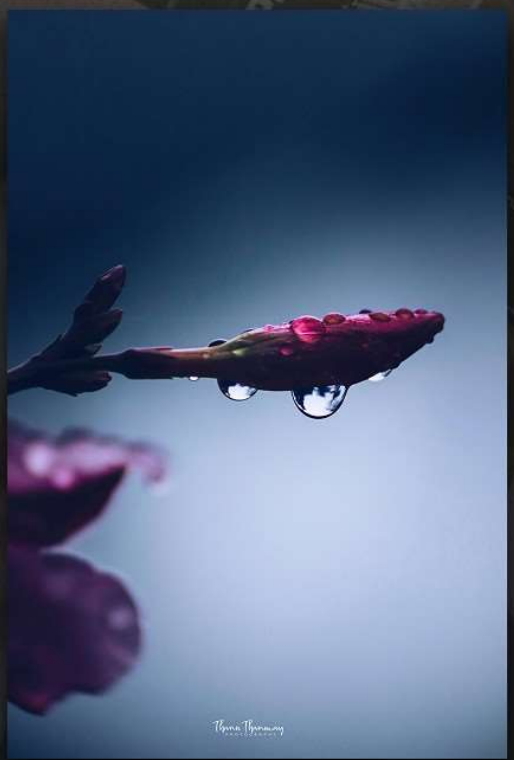
-Sayooj Rajesh , S6 CE

-Sayooj Rajesh , S6 CE

-Sayooj Rajesh , S6 CE

-Alin Danis , S4 CE

-Albert George ; S4 CE



Thanmay Thampi, S4 CE

Thanmay Thampi, S4 CE

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Thanmay Thampi, S4 CE

-Nishikanth K.S., S4 CE

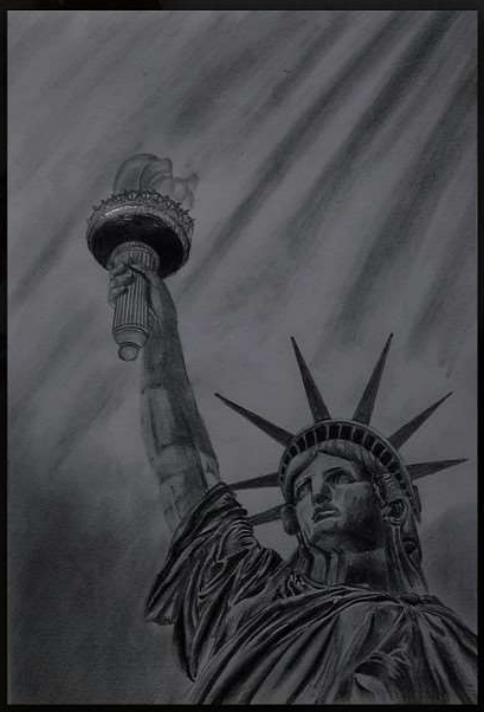
-Jerrita John, S8 CE

-Joe Merin Joy, S2 CE

-Sajna Azeez, S2 CE

Sushya C.V., S8 CE

-Farhana K.S., S2 CE



-Anagha Binoj, S6 CE

-Lisna Jose, S4 CE

Maria Jerry, S6 CE

THE ENDING NOTE.

Have you ever wondered how everything mundane and boring suddenly becomes extraordinary once you associate sentimental values with it? Perplexing, isn't it? What could've been just another prosaic department magazine now holds so much power in its pages that its significance transcends far beyond the boundaries of mere material worth. In other words, this is not just another magazine for us. This is a portal to a vast deluge of memories that would be cherished at all times. An aide-memoire that holds the essence of what might've been the brightest time of our lives. Come to think of it, maybe this is just another desperate attempt to salvage the heartiest of laughter and the most wholesome of moments from perishing in the inevitable hands of time. Even if those memories aren't visibly here, they stand immortalized in the timeless effort of our students that turned this collective dream into reality, so that later on, if fate brings our attention to these pages amidst a monotonous routine, it could take us back to the days that had helped us thrive into better humans and compassionate adults.

Indeed, we have trouble putting into words how profoundly grateful we are to you for going through The Revival, thereby conferring more meaning to the endless hours spent behind the making of this issue. Speaking of endless hours, this would have been a mirage in the distance obscured by academic hustle if not for the patience and perseverance of many students who had been devotedly working towards the completion of this goal. In this note, we look up to their dedication in reverence. To the readers for pitching in their time to traverse through these pages with us, we convey our heartfelt gratitude. You made our experience more satisfying and a sense of accomplishment all the more gratifying. Even as you close these pages, please bear in mind that we will always be here to welcome you back.

The pandemic had taken several tolls of varying degrees on each one of us. While we cannot expect to have what was stolen from us, we can still hold on to the memories, hoping their revival would be a prelude to the good times that are yet to come.

Regards,
Department of Civil Engineering

2020-'21