KSR College of Engineering

AN AUTONOMOUS INSTITUTION

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25 Years KSRCE 2001 – 2026 Celebrating Academic Excellence

CIVIL ENGINEERING - LATTICE

2025 - 2026

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CHAIRMAN'S MESSAGE

SHRI.R. SRINIVASAN, CHAIRMAN
K.S.R EDUCATIONAL INSTITUTIONS

As we stand on the brink of new beginnings and boundless possibilities, I am filled with an immense sense of pride and optimism about what we can achieve together at KSR Educational Institutions. Our founder, Dr. K S Rangasamy, laid a strong foundation rooted in the belief that education is the most powerful tool to transform lives. Carrying forward his legacy, we remain committed to not just educating but empowering young minds to make a meaningful impact in the world. In today's fast-paced, technology-driven society, the challenges are as dynamic as the opportunities are great. It is imperative for education to transcend traditional learning and encompass the development of holistic, innovative, and critical thinking skills. At KSR, we strive to equip you, our students, with the capabilities to not only adapt to changes but to drive them. We are dedicated to nurturing a generation of leaders, innovators, and thinkers who are ready to take on global challenges with local sensibilities. Making an Impact is not just a phrase—it's our mission. It's about inspiring each one of you to pursue your passions with determination and a sense of responsibility towards the betterment of society. We encourage you to dream big, push boundaries, and question the status quo. Our campus is a melting pot of ideas where your creativity and ambitions are nurtured, allowing you to flourish in ways you never imagined.

DEAN'S MESSAGE

Dr. M. VENKATESAN,
DEAN – KSRCE

As a Dean of KSRCE, I actively play my role to facilitate students to become best academicians, researchers and policy makers. I provide a diverse and inclusive work environment to my colleagues and drive them wherever necessary to play a role in getting utmost national and international agencies support Institution. A collaborative and integrated approach towards teaching, learning and research will be emphasized. I strongly believe that the KSRCE team will overcome the constraints facing to deliver the best Engineering services to the society and reach the desired goals.

PRINCIPAL'S MESSAGE

Dr. P. MEENAKSHI DEVI
Principal, KSRCE

It's a moment of great pride and joy to unveil the Department Magazine for the academic year **2025 – 2026**!

KSRCE today is more than just an institution — it's a vibrant family, where educators, students, parents, alumni, and management come together with one shared vision: to grow, inspire, and achieve.

We believe in nurturing not just bright minds, but well-rounded individuals — industry-ready, globally competent, and socially responsible citizens of tomorrow.

A big shoutout to Prof. Dr. S. Senthilkumar, HoD/Civil, and his dynamic team, whose creativity, effort, and dedication have brought this magazine to life. Kudos to their passion and teamwork!

Dr. S. SENTHILKUMAR
Professor & Head, Civil, KSRCE

It gives us immense joy to present LATTICE 2025 — a magazine crafted with passion and purpose, built as a stage for ideas, innovations, and inspiration.

Creativity begins with a dream — a desire to express the talent within. That very dream powered our journey and brought LATTICE 2025 to life. We're deeply grateful to everyone who made this dream possible.

First, a heartfelt thank you to our visionary Chairman, whose constant support gave us the platform to shine. A special thanks to our motivating Principal, whose encouragement turned ideas into action.

This magazine wouldn't be what it is without our amazing editorial squad, who believed, collaborated, and created every page with dedication. To the student and faculty coordinators — your enthusiasm and support were unmatched.

Thanks to all faculty members who pitched in with proofing and polishing our work.

VISION OF THE INSTITUTITON

To become a globally renowned institution in Engineering and Management, committed to providing holistic education that fosters research, innovation and sustainable development.

MISSION OF THE INSTITUTITON

Deliver value-based quality education through modern pedagogy and experiential learning.

Enrich Engineering and Managerial Skills through cutting-edge laboratories to meet evolving global demands.

Empower research and innovation by integrating collaboration, social responsibility and commitment to sustainable development.

VISION OF THE DEPARTMENT

To develop premier Civil Engineers through education, fostering innovation and research to create a sustainable environment.

MISSION OF THE DEPARTMENT

Provide value-based education using advanced teaching methods and experiential learning.

Prepare engineers for global challenges through state-of-the-art labs and advanced skills.

Promote research, foster innovation, and strengthen industry collaboration, addressing infrastructure challenges through sustainable solutions.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1 Core Competency: Apply comprehensive civil engineering knowledge to analyze, design, and solve real-world problems.

PEO2 Professionalism: Apply ethical principles, communicate effectively, and collaborate in multidisciplinary teams.

PEO3 Career Development: Attain professional success, embrace lifelong learning, and develop leadership skills to make a positive impact in their fields.

PROGRAMME OUTCOMES

PO1 Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2 Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3 Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/ components/ processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4 Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5 Engineering Tool Usage: Create, select, and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6 The Engineer and the World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.

PO7 Ethics: Apply ethical principles and commit to professional ethics,

	human values, diversity and inclusion: adhere to national & international laws.
PO8	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse / multi-disciplinary teams.
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language and learning differences.
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member in a team, and to manage projects and in multidisciplinary Environments.
PO11	Life-long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1	Structural Analysis and Design: Plan and design structural systems that ensure safety, sustainability, and compliance with relevant codes and standards.
PSO2	Construction Planning and Management: Develop sustainable construction materials from waste, ensuring environmentally responsible waste management and complying with relevant regulations and standards.

ABOUT THE DEPARTMENT

Established in 2002, the Department aims to advance education quality, achieve academic excellence, and promote research and consultancy to benefit the community and industry. With advanced laboratories, skilled faculty, modern equipment, and professional software, the department offers B.E. Civil Engineering, M.E. - Structural Engineering, M.E. - Construction Engineering. The department features well-equipped laboratories designed to meet the requirements of both undergraduate and postgraduate programs, in addition to providing consultancy and material testing services.

Recognized as an authorized research centre by Anna University, Chennai, the department facilitates Ph.D. programs and advanced research. With 33 Ph.D. scholars successfully graduated and over 60 alumni serving in government sectors, the department exemplifies academic excellence. Our consultancy projects drive innovation and support industries and students in research and product development. Notable clients include the District Rural Development Agency (DRDA), Public Works Department, Municipalities, Southern Railway, and private organizations. We are dedicated to fostering societal and industrial progress through impactful research and collaboration.

CONTENTS

UTILIZING REVIT BIM TOOLS FOR EFFICIENT CONSTRUCTION PROJECT MANAGEMENT

PERUMAL P, RANJITH R G, I Year Civil, Sengunthar Engineering College, Tiruchengode

ABSTRACT

Building Information Modeling (BIM) is rapidly transforming construction practices by providing advanced tools for design, visualization, and project coordination. Autodesk Revit, one of the leading BIM platforms, integrates multiple aspects of construction project management, including planning, scheduling, cost estimation, and interdisciplinary collaboration, into a single digital environment. This presentation focuses on the application of Revit BIM in construction project management, highlighting its role in streamlining workflows, minimizing errors, and enhancing overall efficiency. Core features such as 3D modeling, clash detection, and integration with project timelines are examined to show how they improve decision-making and stakeholder communication. The discussion also emphasizes how Revit helps optimize material usage, reduce rework, and support sustainable, cost-effective construction practices. Findings suggest that the adoption of Revit in project management results in better resource allocation, improved coordination between architects, engineers, and contractors, and greater productivity throughout the project lifecycle.

TOWARDS SUSTAINABLE CONSTRUCTION: GREEN CONCRETE WITH RECYCLED MATERIALS

PAVITHRA SRI N, ADHARSHA A U, KIRTHIKA N, II Year Civil, Adhiyamaan College of Engineering

ABSTRACT

The construction industry significantly impacts the environment through high consumption of natural resources, energy use, and greenhouse gas emissions. Green concrete offers a sustainable solution by incorporating recycled aggregates from construction and demolition (C&D) waste and industrial by-products like fly ash, GGBS, silica fume, and marble dust as partial replacements for natural aggregates and cement. Using recycled aggregates reduces the exploitation of natural resources, while industrial waste lowers cement consumption and CO_2 emissions. This study focuses on the mechanical and durability properties of green concrete, including compressive strength, workability, and resistance to chemical attack. Proper treatment and grading of recycled aggregates enhance their performance in the mix. Research findings show that with optimized proportions, green concrete can match or even exceed the strength and durability of conventional concrete. Its use promotes sustainable construction, waste management, and a circular economy, making it a key step toward reducing the environmental footprint of infrastructure development.

SMART AND SUSTAINABLE SOLUTIONS FOR MODERN CONSTRUCTION PROBLEMS

MONIKA K, GOKULAPREETHI SELVAM, III Year Civil, Muthayammal Engineering College

ABSTRACT

The construction industry faces numerous challenges, including rapid urbanization, scarcity of natural resources, rising construction costs, environmental degradation, and the urgent need for sustainable development. Innovative approaches are essential to overcome these issues and improve efficiency, safety, and sustainability in modern construction practices. One key innovation is the adoption of green and sustainable materials, such as recycled aggregates, industrial by-products, and low-carbon cement alternatives, which help reduce the sector's carbon footprint. Smart construction technologies, including Building Information Modeling (BIM), drones, and AI-driven project management tools, enhance planning accuracy, reduce errors, and optimize resource utilization. Additionally, prefabrication and modular construction methods accelerate project timelines, reduce material waste, and ensure consistent quality. The integration of 3D printing in construction enables cost-effective, customized building components and rapid construction in disaster-prone areas. Furthermore**,** IoT-enabled monitoring systems and wearable devices improve safety and real-time tracking of site operations.

SUSTAINABLE DESIGN THROUGH INNOVATION IN STRUCTURAL SYSTEMS

AAKASH P, SATHYA M, JAGAN S, II Year Civil, MPNMJ Engineering College

ABSTRACT

Sustainable structural design aims to create eco-friendly, durable, and efficient structures to combat climate change, resource scarcity, and environmental degradation. Key innovations include the use of green materials like recycled aggregates, geopolymer concrete, bamboo, and low-carbon cement to reduce the carbon footprint while maintaining strength and performance. Smart design technologies such as Building Information Modeling (BIM) and AI-driven tools optimize material usage, improve structural efficiency, and predict life cycle performance. Prefabrication and modular construction techniques enable faster, cost-effective building with minimal waste, while self-healing concrete and adaptive materials increase service life and reduce maintenance. Additionally, integrating renewable energy systems and passive design strategies enhances energy efficiency and resilience. These advancements support the development of low-carbon, future-ready structures that promote sustainable growth and align with circular economy principles.

ADAPTIVE AND SUSTAINABLE STRUCTURES INSPIRED BY NATURAL SYSTEMS

SAKTHIVEL R, DHANAM C, SANTHOSH M, II Year Civil, ACE College of Engineering

ABSTRACT

Structures that breathe" represent a design philosophy where buildings and infrastructure coexist harmoniously with nature, mimicking natural processes to create sustainable and healthy environments. These structures integrate passive ventilation systems, green facades, and breathable materials that allow natural airflow, reducing dependence on mechanical cooling and improving indoor air quality. Inspired by biophilic and biomimetic design, they incorporate elements like vertical gardens, living walls, and permeable surfaces to regulate temperature and support biodiversity. Advanced technologies such as smart sensors and climate-responsive facades enable buildings to adapt dynamically to environmental changes. By blending renewable energy systems, water recycling, and natural lighting strategies, these designs reduce carbon emissions while fostering well-being for occupants.

INNOVATIONS IN GREEN BUILDING DESIGN AND CONSTRUCTION

CHANDRU S, VASANTH V, SANJAY S, IV Year Civil, AVS Engineering College

ABSTRACT

Green building design and construction focus on creating structures that are environmentally responsible, resource-efficient, and sustainable throughout their life cycle. This approach integrates eco-friendly materials, energy-efficient systems, and innovative construction techniques to minimize the environmental impact of buildings. Key strategies include the use of renewable energy sources, natural lighting, passive cooling, rainwater harvesting, and efficient waste management systems. Sustainable materials such as recycled aggregates, bamboo, fly ash, and low-carbon cement are used to reduce resource depletion and greenhouse gas emissions. Tools like Building Information Modeling (BIM) help optimize designs, reduce material wastage, and improve construction efficiency. Green buildings also prioritize indoor environmental quality through natural ventilation and non-toxic finishes, enhancing occupant health and well-being. Certifications such as LEED, IGBC, and GRIHA guide the implementation of sustainable practices. By reducing energy consumption, water usage, and overall carbon footprint, green buildings play a crucial role in combating climate change and promoting long-term environmental harmony, while also offering economic and social benefits.

REVOLUTIONIZING CONSTRUCTION THROUGH ADVANCED TECHNOLOGY

D.GOWTHAM, S. SURIYA PRASATH, III Year Civil, Muthayammal Engineering College

ABSTRACT

Advanced construction technology focuses on improving the efficiency, quality, and sustainability of construction processes through innovative methods and materials. It integrates modern tools, digital technologies, and advanced equipment to address challenges such as labor shortages, rising costs, and environmental concerns. Key advancements include Building Information Modeling (BIM) for precise planning and coordination, 3D printing for rapid and cost-effective construction, and prefabrication and modular building techniques that reduce time, waste, and onsite labor. Smart construction technologies, such as drones, robotics, and AI-powered project management, enhance accuracy, safety, and real-time monitoring of construction sites. The use of high-performance materials like self-healing concrete, fiber-reinforced composites, and sustainable alternatives improves structural durability and environmental performance. Additionally, Internet of Things (IoT) devices and sensors enable smart infrastructure with predictive maintenance capabilities.

TRANSFORMING CONSTRUCTION WITH INNOVATIVE MATERIALS AND TECHNOLOGIES

GOPIKA T, SOWMIYA A, III Year Civil, Muthayammal Engineering College

ABSTRACT

Innovative materials and technologies are transforming the construction industry by improving sustainability, durability, and efficiency. The development of eco-friendly materials such as geopolymer concrete, recycled aggregates, bamboo composites, and low-carbon cement helps reduce greenhouse gas emissions and conserve natural resources. High-performance materials like self-healing concrete, fiber-reinforced polymers, and nano-materials enhance strength, durability, and resistance to environmental stresses. On the technology front, 3D printing, prefabrication, and modular construction enable faster, cost-effective building with minimal waste. Building Information Modeling (BIM) and AI-driven design tools optimize resource use, improve accuracy, and streamline project management. Additionally, smart technologies such as IoT sensors, drones, and robotics enhance safety, real-time monitoring, and predictive maintenance. These innovations not only address modern construction challenges but also promote sustainable practices, paving the way for resilient, energy-efficient, and future-ready infrastructure.

DIGITAL AND SMART TOOLS SHAPING THE FUTURE OF CONSTRUCTION

SURENDHAR R, MOUSIYA P, III Year Civil, Mahendra Engineering College

ABSTRACT

Digital and smart solutions are revolutionizing the construction industry by enhancing efficiency, accuracy, and sustainability. Building Information Modeling (BIM) allows integrated design, planning, and coordination, reducing errors and material waste. Artificial Intelligence (AI) and machine learning optimize project scheduling, cost estimation, and risk management, while Internet of Things (IoT) devices enable real-time monitoring of construction sites, structural health, and equipment performance. Drones and robotics improve surveying, inspection, and automated construction tasks, enhancing safety and productivity. Smart sensors and climate-responsive systems allow buildings to adapt to environmental conditions, improving energy efficiency and occupant comfort. By integrating these digital tools and smart technologies, the construction industry can achieve faster project delivery, reduced costs, and sustainable, resilient infrastructure that meets the demands of modern urban development.

ADVANCING CONSTRUCTION MANAGEMENT THROUGH DRONE TECHNOLOGY

SUGUMAR R, HARISH S, BALAJI P, IV Year Civil, Paavai Engineering College

ABSTRACT

Drones are increasingly transforming construction site monitoring by providing efficient, accurate, and real-time data collection. Equipped with high-resolution cameras, LiDAR, and GPS sensors, drones enable rapid surveying, topographic mapping, and 3D modeling of construction sites, significantly reducing the time and labor compared to traditional methods. They enhance progress monitoring, allowing project managers to track work completion, identify delays, and optimize resource allocation. Drones also improve safety by inspecting hard-to-reach or hazardous areas without risking human lives. Additionally, they facilitate quality control and site documentation, capturing detailed visual records for reporting, dispute resolution, and regulatory compliance. By integrating drone data with BIM and project management software, construction teams can make informed decisions, improve accuracy, and streamline workflows. Overall, the use of drones increases efficiency, reduces costs, enhances safety, and supports data-driven construction management, making them a vital tool for modern infrastructure projects.

STRUCTURAL ENGINEERING FOR GREEN AND SUSTAINABLE DESIGN

LOGESHWARAN S, SRINIVASAN S, IV Year Civil, Mahendra Engineering College

ABSTRACT

Structural engineers play a critical role in promoting sustainability in the construction industry by designing safe, efficient, and environmentally responsible structures. They optimize material usage and structural systems to reduce waste and minimize the carbon footprint of buildings and infrastructure. By incorporating eco-friendly materials such as recycled aggregates, low-carbon cement, and high-performance composites, they contribute to resource conservation and energy efficiency. Structural engineers also integrate life-cycle assessment and durability considerations to extend the service life of structures, reducing the need for frequent repairs and replacements. Additionally, they collaborate with architects and other professionals to implement passive design strategies, renewable energy systems, and climate-resilient features. Through innovative design, efficient construction methods, and sustainable material selection, structural engineers ensure that modern structures meet performance requirements while aligning with environmental goals, supporting the broader objective of sustainable urban development.

SMART AND INNOVATIVE TECHNIQUES FOR SEISMIC-RESISTANT BUILDINGS

BOOMIKA.C, PRAGATHEESHWARAN.D, II Year Civil, Paavai Engineering College

ABSTRACT

Earthquake-resistant structural innovations are essential for enhancing the safety, resilience, and durability of buildings and infrastructure in seismic zones. Modern approaches focus on energy dissipation, structural flexibility, and load redistribution to minimize damage during seismic events. Key innovations include base isolation systems, which decouple the structure from ground motion, and damping devices like viscous, friction, and tuned mass dampers that absorb seismic energy. High-performance materials, such as fiber-reinforced concrete, high-strength steel, and shape-memory alloys, improve ductility, strength, and post-earthquake recoverability. Advanced structural systems, including moment-resisting frames, shear walls, braced frames, and coupled wall systems, are optimized using computer modeling, seismic simulation, and performance-based design to predict behavior under earthquake loads. Modular and prefabricated construction techniques allow for quality-controlled, resilient components that can withstand seismic forces.

INNOVATIVE GREEN BEAM DESIGNS FOR SUSTAINABLE CONSTRUCTION

MOULEESWARAN.P, DHARUN.S, II Year Civil, Muthayammal Engineering College

ABSTRACT

Green Beams and Smart Dreams" symbolize the fusion of sustainable materials with intelligent design in modern construction. Green beams represent structural elements made from eco-friendly and high-performance materials such as recycled aggregates, bamboo composites, fly ash concrete, and low-carbon cement, reducing the environmental footprint while maintaining strength and durability. Smart dreams refer to the integration of digital technologies, IoT sensors, and AI-driven monitoring systems that optimize structural performance, energy efficiency, and safety throughout the building's lifecycle. Together, they enable adaptive, resilient, and energy-efficient structures that respond to environmental conditions, minimize waste, and promote occupant comfort. This combination embodies a vision where sustainability and innovation converge, creating infrastructure that harmonizes with nature while meeting the demands of modern urban living.

NEXT-GENERATION TECHNIQUES IN GEOTECHNICAL ENGINEERING

SAKTHIVEL S, DHAMOTHARAN M, II Year Civil, Sri Venkateshwara Hi-Tech Engineering College

ABSTRACT

Advanced geotechnical engineering focuses on the study and application of innovative methods to analyze, design, and improve soil-structure interactions for safe and sustainable infrastructure development. It integrates modern technologies and research to address challenges such as soil instability, foundation failures, and ground improvement in complex geological conditions. Key advancements include geosynthetics, ground improvement techniques, and deep foundation systems like micropiles, stone columns, and soil nails that enhance load-bearing capacity and stability. Geotechnical instrumentation and monitoring systems, including piezometers, inclinometers, and remote sensing technologies, allow real-time assessment of soil behavior and structural performance. Computational tools such as finite element modeling and GIS-based site analysis enable accurate prediction of soil-structure responses under various loading and environmental conditions. Additionally, sustainable practices, including the reuse of industrial by-products for soil stabilization, reduce environmental impact.

STRUCTURAL APPLICATIONS OF BAMBOO AND TIMBER MATERIALS

JANANI B. S, ARAVINDHAN G, IV Year Civil, Adhiyamaan Engineering College

ABSTRACT

The increasing demand for sustainable and eco-friendly construction materials has renewed interest in bamboo and timber as viable structural alternatives. Bamboo, known for its high tensile strength, flexibility, and rapid growth, is suitable for scaffolding, trusses, flooring, and low-cost housing, particularly in earthquake-prone regions due to its seismic resistance. Engineered bamboo products, such as laminated panels, expand its applicability in modern construction. Timber, on the other hand, is widely used for beams, columns, floors, and roofing systems, with engineered wood products like glulam, cross-laminated timber (CLT), and laminated veneer lumber (LVL) providing enhanced strength, stability, and fire resistance for multi-story and commercial buildings. Both materials offer excellent thermal insulation, aesthetic appeal, and reduced environmental impact compared to conventional concrete and steel. This abstract highlight the potential of bamboo and timber to promote green, resilient, and sustainable structural systems, supporting environmentally responsible construction while meeting modern performance and durability requirements.

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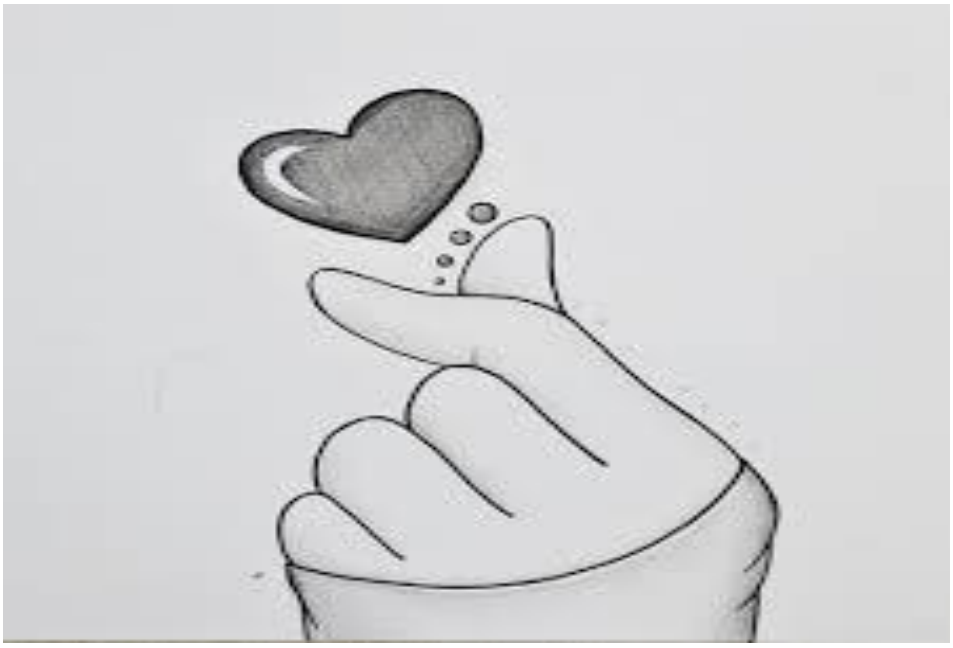

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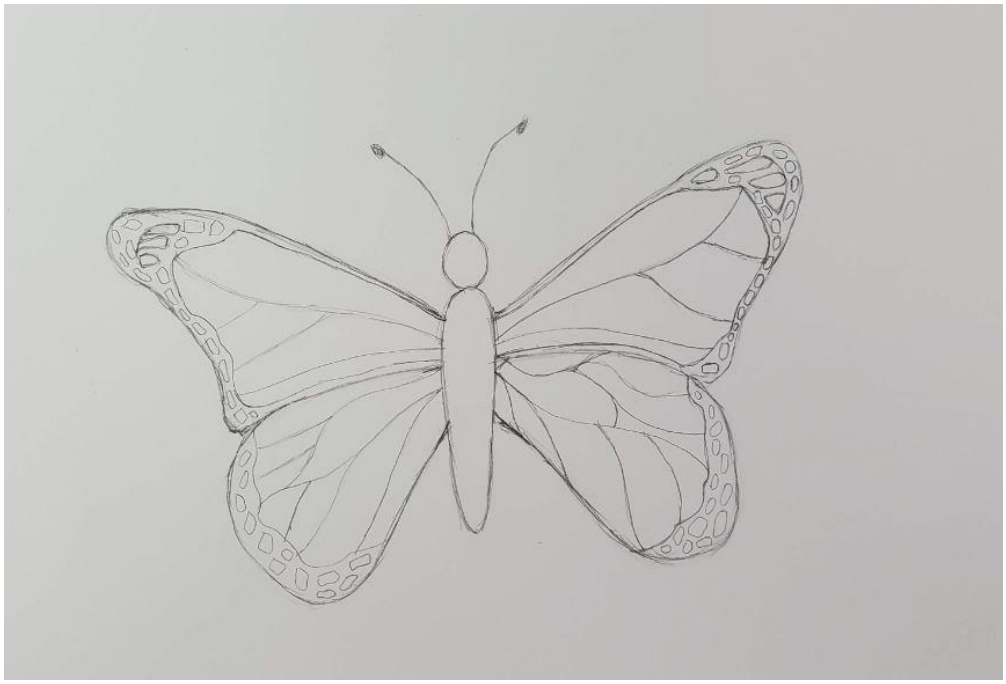

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IN THE WORLD OF CIVIL ENGINEERING, WE DON'T JUST SOLVE FOR SOMETHING; WE SOLVE FOR THE SAFETY OF THOUSANDS.