

A CIVIL ENGINEERING MAGAZINE

INGENIUM

2021



DEPARTMENT OF CIVIL ENGINEERING
VELAMMAL COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Viraganoor, Madurai - 625009





INSTITUTE VISION

- **To emerge and sustain as a centre of excellence for technical and managerial education upholding social values**

INSTITUTE MISSION

- **Imparted with comprehensive, innovative and value based education**
- **Exposed to technical, managerial and soft skilled resources with emphasis on research and professionalism**
- **Inculcated with the need for a disciplined, happy, married and peaceful life**

DEPARTMENT VISION

- **To inspire and mould civil engineering aspirants as competent and dynamic infrastructure developers**

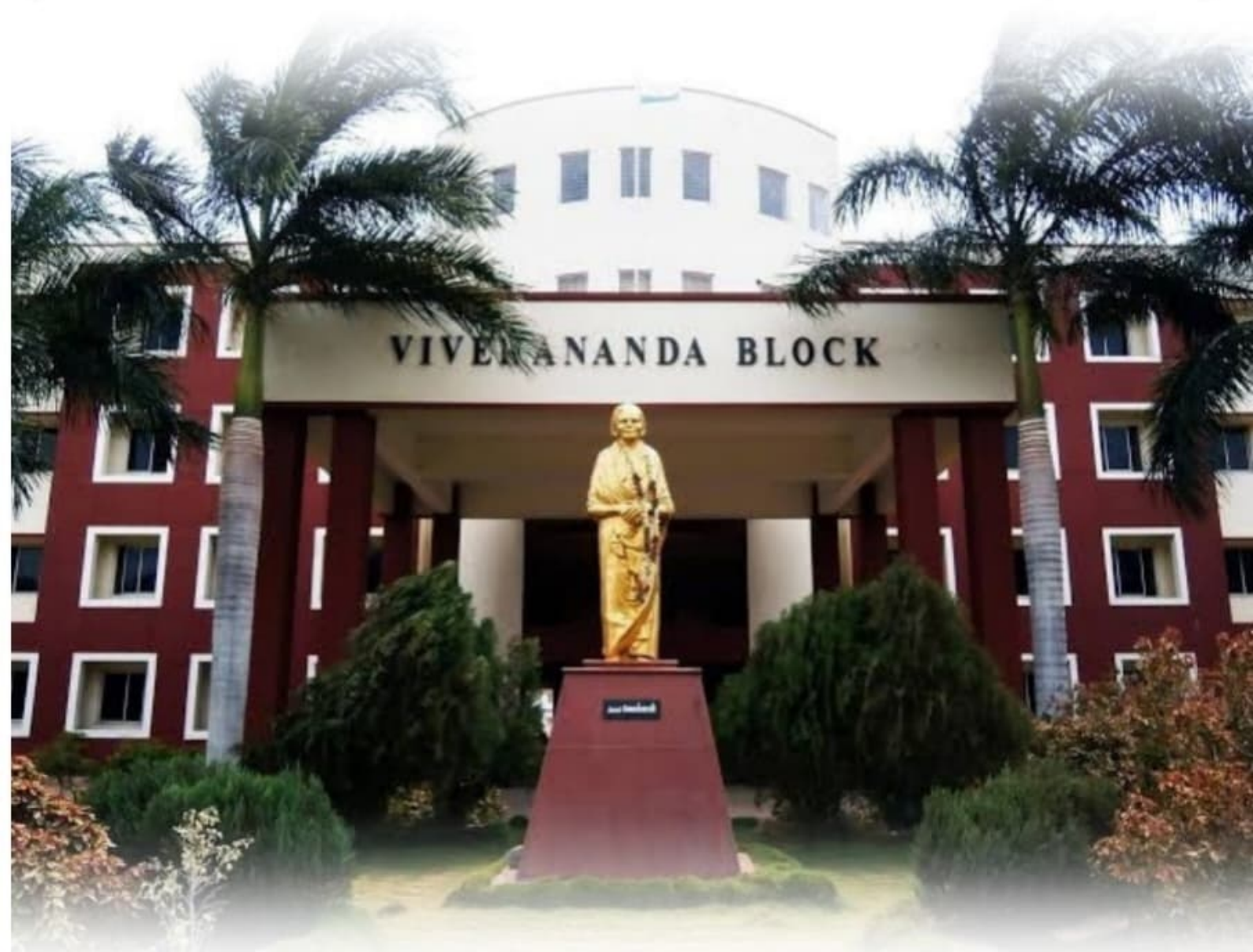
DEPARTMENT MISSION

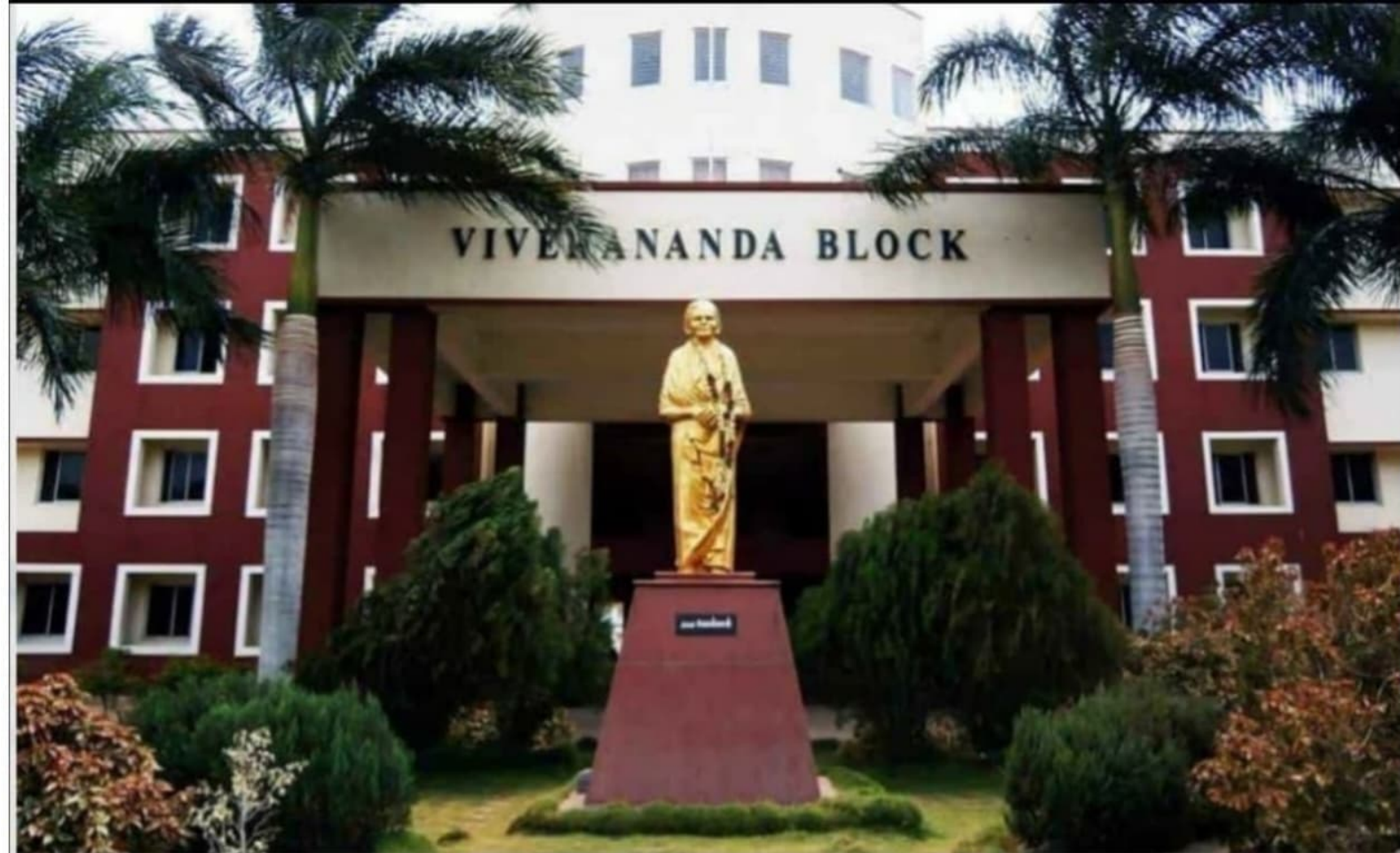
Our mission is to

1. **Integrate high Quality civil engineering education and research**
2. **keep the students abreast with the state of art, theory and practice**
3. **Create a supportive environment to meet professional challenges**

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**VELEMAL COLLEGE OF
ENGINEERING AND
TECHNOLOGY-
MADURAI**

DR.N.SURESH KUMAR

PRINCIPAL-VCET

Engineering Education is now an integral and indispensable component of contemporary society. A nation's level of development is proportional to the availability of quality engineering education. The Velemaal College of Engineering and Technology is a pioneering engineering institution that ranks among the best in the nation. Among the numerous engineering institutions in the southern districts of Tamil Nadu, VCET stands tall. Students can anticipate the finest infrastructure, highly qualified and experienced faculty, and pedagogical ideals of the highest order.

While I am proud to be affiliated with the institution and its administration, I assure all stakeholders that they will receive an engineering education of the highest quality.



DEPARTMENT OF
CIVIL ENGINEERING

VELEMAL COLLEGE OF
ENGINEERING AND
TECHNOLOGY-
MADURAI

DR.L. ANDAL

HEAD OF THE DEPARTMENT - VCET

Velammal College of Engineering and Technology's Department of Civil and Environmental Engineering extends a cordial greeting. Our work as practising and aspiring engineers is crucial for a world that is constantly evolving. The infrastructure of our modern society, such as roads, bridges, buildings, and water distribution systems, is designed by civil engineers. Environmental engineers develop solutions for the responsible utilisation of resources and energy in order to protect our air and water supplies. Together, civil and environmental engineers are creating the Built Environment, a world that is stronger, safer, and more sustainable.

Our department provides academic programmes of the highest calibre, supported by facilities of the highest calibre. Our faculty are committed to teaching excellence while fostering an inclusive learning environment where all students can flourish. We offer coursework and research opportunities in five engineering disciplines: Environmental Engineering, Geotechnical Engineering, Structural Engineering, Transportation Engineering, and Water Engineering.

Our alums have exciting careers and leadership positions around the world, addressing the complex engineering challenges of the present. If you envision yourself in a dynamic and rewarding career, a degree in civil and environmental engineering may be the right choice for you. Explore our academic programmes or get in touch with us to meet with a recruiter. We anticipate seeing you at VCET



TECHNICAL

- A BUILDING INTEGRATED PHOTOVOLTAICS
- PRECAST CONSTRUCTION
- HARNESSING ENERGY FROM KINETIC ROADS
- CHENAB BRIDGE
- STATUE OF UNITY
- PREFRABICATED BUILDINGS
- FLYOVER

BUILDING INTEGRATED PHOTOVOLTAICS

This article sheds light on the innovative solution for sustainable buildings. Photovoltaic cells (PV), or simply solar cells, directly transform sunlight into electricity with an industry-wide calling for sustainable infrastructure, PV cells can definitely be a game-changer.

Building Integrated Photovoltaics (BIPV) is the integration of photovoltaics (PV) into the building envelope. The PV modules serve the dual function of building skin-replacing conventional building envelope materials-and power generator. One of the main advantages of BIPV is that from an aesthetic point of view, it looks like part of the building, rather than a bolt-on. But beyond the aesthetic advantage, there is an often overlooked cost efficiency. When BIPV, such as photovoltaic glaze, is used in a building, it replaces part of the materials that would have been needed otherwise.

So it is a 2-in-1 solution. Rather than purchasing glass windows beside photovoltaic cells, it is sufficient to buy the photovoltaic glaze, which will not only generate electricity but also serve as windows. Therefore, BIPV systems offset the cost of traditional buildings. In 2019, U-Solar Clean Energy Solutions Pvt. Ltd. installed India's largest building integrated vertical solar PV system at a data center in Mumbai. The system, with a capacity of about 1 MW, has been installed by integrating solar panels on all four walls of the facility, covering over 5000 square feet of facade area.

C.HARIPREETA
21CIV07
FIRST YEAR

PRECAST CONSTRUCTION

MUMBAI METRO LINE 2A

Precast construction is a system of casting concrete in a reusable mould or 'form' which is then treated in a controlled environment, conveyed to the construction site and lifted to the place. Various precast elements can be constructed such as walls, beams, slabs, columns, staircase, landing and some customized elements. These are standard and designed for stability, durability and structural integrity of the building. This technology is suitable for construction of high-rise building. There are two main types of precast concrete elements, namely precast reinforced concrete elements and precast pre-stressed concrete elements.



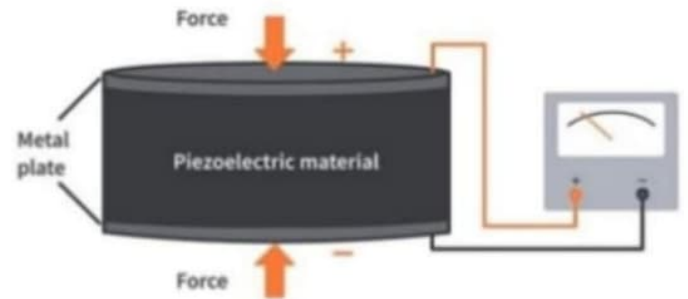
MUMBAI METRO LINE 2A is project executed by **MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY (MMRDA)**. This line is from Dahisar to Andheri, the length is about 20.6 kms. This metro line was decided to have maximum of precasted elements and structural features like station buildings, concourse level, platform and track level, viaduct superstructure, substructure were considered.



SRUTHE SRI P B H
21CIV19
FIRST YEAR

HARNESSING ENERGY FROM KINETIC ROADS

Energy conservation reduces our reliance on non renewable energy sources and also helps in reducing the carbon footprint. The total energy composition of India in the year 2020 is 940KWh . So to satiate the growing need of global energy complication the concept of energy harvesting is introduced by kinetic roads. The kinetic roads work on the concept of converting the mechanical energy exerted by traffic into electrical energy. This can be achieved by the application of piezoelectric devices or sensors in the roadway infrastructure.



SRINIDHI S
21CIV18
FIRST YEAR

This device generates a high electric voltage when exposed to deformations in its surface caused by mechanical impulses, mild pressure changes and vibrations . The piezoelectric transducers collect and store the energy in an electronic capacitor which can further be used for charging devices. 1km of piezoelectric road of one lane can generate 44000KWh per year. Currently piezoelectric roads are designed in California and efforts are made to implement this technology in India

CHENAB BRIDGE

The Chenab Bridge — having a length of 1.315 km — will be the highest railway bridge in the world being 359m above the river bed level and will be 35 meters higher than the Eiffel Tower in Paris (France). It involves the fabrication of 28,660 metric tonnes of steel, 10 lakh cum earthwork, 66,000 cum concrete, and 26 km motorable roads. Chenab Bridge has the widest span of the Indian broad gauge railway network in the country. Prime Minister Narendra Modi lauded the completion of Arch closure of the Chenab Bridge, the world's highest railway bridge in Jammu & Kashmir by the Indian Railways.



LALLIT KISHORE
21CIV27
FIRST YEARg

ACCORDING TO A STATEMENT ISSUED BY THE MINISTRY, THE ARCH CLOSURE WAS ONE OF THE MOST DIFFICULT PARTS OF THE BRIDGE OVER CHENAB AND ITS COMPLETION IS A MAJOR LEAP TOWARDS THE COMPLETION OF THE 111 KM-LONG WINDING STRETCHES FROM KATRA TO BANIHAL. IT IS ARGUABLY THE BIGGEST CIVIL-ENGINEERING CHALLENGE FACED BY ANY RAILWAY PROJECT IN INDIA IN RECENT HISTORY. THE 5.6-METER LAST PIECE OF METAL WAS FITTED AT THE HIGHEST POINT TODAY AND JOINED THE TWO ARMS OF THE ARCH THAT CURRENTLY STRETCH TOWARDS EACH OTHER FROM BOTH THE BANKS OF THE RIVER. THIS COMPLETED THE SHAPE OF THE ARCH THAT WILL THEN LOOM OVER THE TREACHEROUS CHENAB, FLOWING SOME 359 METERS BELOW.

STATUE OF UNITY

The Statue of Unity is the world's tallest statue, with a height of 182 meters (597 feet), located in the state of Gujarat, India. It depicts Indian statesman and independence activist Vallabhbhai Patel (1875–1950),

who was the first deputy prime minister and home minister of independent India and an adherent of Mahatma Gandhi.

construction of the statue started in October 2013 by Indian company Larsen & Toubro, with a total construction cost of ₹2,700 crore

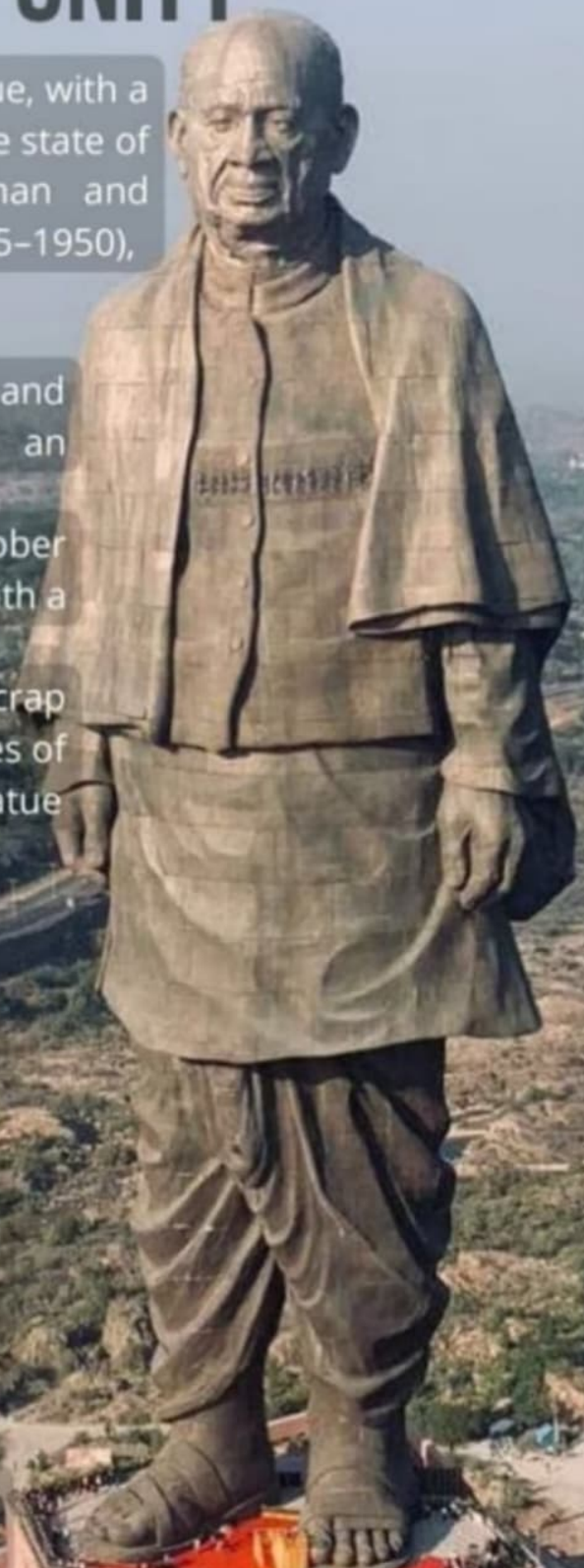
By 2016, a total of 135 metric tonnes of scrap iron had been collected and about 109 tonnes of it was used to make the foundation of the statue

L&T employed over 3000 workers and 250 engineers in the statue's construction. The core of the statue used 210,000 cubic metre (7,400,000 cu ft) of cement and concrete, 6,500 tonnes of structural steel, and 18,500 tonnes of reinforced steel. The outer façade is made up of 1,700 tonnes of bronze plates and 1,850 tonnes of bronze cladding which in turn consists of 565 macro and 6000 micro panels. The bronze panels were cast in Jiangxi Tonguing Metal Handicrafts Co. Ltd (the TQ Art foundry) in China as facilities large enough for such casting were unavailable in India. The bronze panels were transported over sea and then by road to a workshop near the construction site where they were assembled.

FIRST YEAR



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PREFABRICATED BUILDINGS

Modular construction is a novel innovation that contributes to the safety and sustainability of the environment. Modular construction includes the mass production of modular units produced offsite and assembled. It has been categorized into offsite, pre assembly, paralyzed systems and modular buildings. By adapting the modular construction technology the overall construction timeline can decrease by 30-50%. Another advantage is that in this technology site preparation and module fabrication occurs simultaneously. Usually concrete, steel and wood are used as the primary building materials in modular construction. Currently prefabricated modular buildings comprise of merely 1% of India's total real estate market. It also cost only ₹800-850 per square.ft when compared to the conventional method which costs around ₹1150. concluding that modular construction method is more cost effective and assistable



FLYOVER

The Kathipara Flyover is of 320 m length with 32 spans, 10 m per span. It consists of a deck slab, longitudinal girders, cross girders, deck beam, pier, and foundation.



A Flyover is a high level road bridge that crosses one railroad or road over another. Flyover can also be described as an overpass or that crosses a highway or intersection.

The difference between the Bridge and Flyover is depending on the purpose of its use and the location where it is being built.

In recent years Flyover Design plays an important role in reducing and diverting the growing traffic in big cities.

With the help of a Hydraulic jack the flyover can be transversed vertically. The Flyover is made up of composite materials, namely concrete and metal structures.

Loads are transferred to the depths of the soil with the help of piles foundation.

Aluminum and steel structures are used as materials in the structural members of the deck and pier.

TYPES OF FLYOVER

01 Simple Flyovers

This is the most commonly used flyover. In this type of flyover, a highway is used for fast traffic, which is made to pass over a high level by a bridge, providing foundations in both directions, and a slow walk is constructed to pass under the flyover

02 Cloverleaf Junction.

Actually, they are clover-shaped interchange. An Inter-change is a junction that utilized a grade separation method to permit the traffic flow from one or more highways through the junction even without actually crossing it or without disturbing the movement of other traffic streams.



SHIAMALA C
21CIV14
FIRST YEAR

A low-angle, upward-looking photograph of several tall skyscrapers in a city. The buildings are made of glass and steel, with some reflecting the sky. In the center, a black traffic light pole extends vertically. The sky is bright blue with scattered white clouds. The overall color palette is dominated by blues, greys, and metallic tones.

NON TECHNICAL

- **DRAWINGS**
- **PAINTINGS**
- **EMBROIDERY**
- **PHOTOGRAPHY**











Bhannesh Kumar
PHOTOGRAPHY

