CIVIL TECH AND TRENDZ

MAGAZINE OF CIVIL ENGINEERING DEPARTMENT

DEC 2020 - APR 2021

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
MYLAVARAM
TRUTH ALWAYS TRIUMPHS
HARD WORK PAYS

contents...

DEPARTMENTAL EVENTS

- **Event Type :**Guest lecture
- **Date / Duration :**07.03.2020
- **Resource person:** Dr.K.B chari,director,GIS labs,hyd
- **Name of Coordinator:** Sri. K. Harish Kumar, Assistant Professor Sri J.Rangaiah, Associate Professor
- **Target Audience:** B Tech Civil 4th year students & 2nd year students

Introduce the Dr K.B. Chari to the students

DEPARTMENTAL EVENTS

- **Event type :** Two day workshop on total station survey & advanced GIS
- **Date / Duration:** 05.03.2020 to 06.03.2020
- **Resource Person:** Dr K.B. Chari, Director, GIS Labs, Hyderabad
- **Name of Coordinator:** Sri J. Rangaiah, Associate Professor Sri. K. Harish Kumar, Assistant Professor
- **Target Audience:** B Tech Civil 4th year students.


Interaction with Dr K.B. Chari


Presentation of Topic


Practice Session


Practice Session

DEPARTMENTAL EVENTS

- **Event type :** Freshers day
- **Date :** 27-02-2021
- **Target Audience:** b tech civil first and second year students




ACHIEVEMENTS

Our students on GATE &IELTS – 2020 qualified list

Name of the students	Roll Number	Score / rank
A . Nethaji Narasimham	16761A01015	451/9485
Nagireddy Venkata Jayasimha	16761A0139	443/99304
N . saigiri	16761A0138	7 BAND
A . Vishnu Vardhan Reddy	16761A0158	5.5 BAND

ACHIEVEMENTS

CAMPUS PLACEMENTS

Student Name	Roll Number	Name Of The Company
K . Chandra Venkata Shabarish	16761A0118	FACE
G. Bhanu	16761A0116	SOUTHER LAND
SK. Saliha	16761A0151	SOUTHER LAND
G. Bhanu	16761A0116	BYJU’S

ACHIEVEMENTS

List Of students Achievements A.Y : (2019-20)

Name of the Event	Name of the activity	Roll Number	Name of the Student	Prize	Name of the Organization/Institute & Place	Date
Lakshya2k19	Creative minds	17761A0105	B. ManjuSree	I-Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Grab the CAD	17761A0137	P. Sadhika	III-Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Best out of waste	17761A0148	T. Kavya Sri	I-Prize	LBRCE-MYM	27-12-2019
Lakshya2k19	ELOCUTION	17761A0148	T. Kavya Sri	II- Prize	LBRCE-MYM	14-09-2019
Lakshya2k19	Creative Minds	17651A0156	Yuddanapudi Bhavani	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Project Expo	19761A0136	P.Keerthi	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Project Expo	19761A0109	B.Yamini	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Quiz	18765A0113	V.Prathysha	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Quiz	17651A0142	P.Mohan Sai Teja Reddy	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Quiz	18761A0122	K.Siva Satyanaayana	2nd Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	Quiz	18761A0102	B.Guruva Reddy	2nd Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	PPT	18765A0106	G.Swetha	1st Prize	LBRCE-MYM	21-12-2019
Lakshya2k19	PPT	18765A0108	K.Sravani	1st Prize	LBRCE-MYM	21-12-2019

RESEARCH & PUBLICATIONS

S. No	Author/ Co-Author	Title of the paper/Books published/ presented	Name of the Journal /Conference/ Events/ Published	Month and Year of publication / presentation	Indexing	DOI
1	J. Eeshwar Ram, T.Muthyalu, V. Ashok, T.Pranay, V.Jagadeesh	Experimental Investigation On Self Compacted Concrete With Self Curing Agents	International Journal of Advanced Science and Technology	June 2020	Scopus	
2	V.Ramakrishna, K.L. Kavya, L. Rajitha, M. Kavitha, P.G. Gopi Reddy	Modelling Of Air Pollution From A Thermal Power Plant In Andhra Pradesh – A Case Study	International Journal of Advanced Science and Technology	June 2020	Scopus	
3	Narasimha Rao.B, Nagaraju.A, Lavanya bai.P, Sarath.V, Rupla Naik.I	Stabilisation of Black Cotton Soil by Using Fly Ash and Rice Husk Ash	International Journal of Advanced Science and Technology	May 2020	Scopus	
4	P. Mohana Gangaraju, K.Venkata Ramayya, P. Bhanu Praksh, Sk. Gouse Basha B. Sri Kumar	Making of Plastic Tiles Using Waste Plastic Collected from Fertilizer Bags, Plastic Wires and Waste Tyre Tubes (Polypropylene, Polyurethane, Thermoplastic and Polyester)	International Journal of Advanced Science and Technology	May 2020	Scopus	

RESEARCH & PUBLICATIONS

List of International Journals Published By Faculty A.Y: (2019-20)

1. J Eeshwar Ram, Thota Muthyalu, Vallepu Ashok, T . Pranay, V . Jagadeesh
“Experimental Investigation On Self Compacted Concrete With Self Curing Agents”
International Journal of Advanced Science and Technology, ISSN: 2005-4238, Vol.
29, No. 05, (June 2020), pp. 10800 – 10805, Published in (Scopus Index Journal)

2. V. Ramakrishna, K.L. Kavya, L. Rajitha, M. Kavitha, P.G. Gopi Reddy “Modelling
Of Air Pollution From A Thermal Power Plant In Andhra Pradesh – A Case Study”
International Journal of Advanced Science and Technology, ISSN: 2005-4238, Vol.
29, No. 7, (June 2020), pp. 5031-5042, Published in (Scopus Index Journal)

RESEARCH & PUBLICATIONS

3. Narasimha Rao . Battina, Nagaraju . A, Lavanya bai . P. Sarath .V , Rupla Naik . I "Stabilization of Black Cotton Soil by Using Fly Ash and Rice Husk Ash" International Journal of Advanced Science and Technology, ISSN: 2005-4238, Vol. 29, No. 5, (May 2020), pp. 9465-9470, Published in (Scopus Index Journal)

4. Madireddy Satyanarayana, Tiriveedhi Sai Krishna, Gottipati Manidhar, B. RaghavaMaheedhar, " Seismic Analysis and Design of G+4 Residential Building by Equivalent Static Analysis Method by Using STAAD Pro" International Journal of Advanced Science and Technology, ISSN: 2005-4238, Vol. 29, No. 5, (May 2020), pp. 9447-9455, Published in (Scopus Index Journal)

5. P. Mohana Gangaraju, K . Venkata Ramayya, P. Bhanu Prakash, Sk. Gouse Basha and B. Sri Kumar5 " Making of Plastic Tiles Using Waste Plastic Collected from Fertilizer Bags, Plastic Wires and Waste Tyre Tubes (Polypropylene, Polyurethane, Thermoplastic and Polyester), International Journal of Advanced Science and Technology, ISSN: 2005-4238, Vol. 29, No. 5, (May 2020), pp. 7657-7662, Published in (Scopus Index Journal)

6. B. Ramakrishna, B. Harshini , G.N.K. Iswarya Lakshmi, K. Sangireddy, K. Pavan Krishna prasad, "Influence of fly ash on the properties of recycled coarse aggregate concrete" International Journal of Emerging Trends in Engineering Research, ISSN 2347 – 3983, Volume 8. No. 5, May 2020,pp 2097-2100, Published in (Scopus Index Journal)

RESEARCH & PUBLICATIONS

7. K. Harish Kumar, K. Chandra Venkata Shabarish, G. Bhanu, K. Durga Vara Prasad, Ch. Satish Kumar “An Experimental Study on Effect of Replacing Natural Sand by Quarry Dust and Saw Dust on Properties of Concrete”, International Journal of Emerging Trends in Engineering Research, ISSN 2347 – 3983, Volume 8. No. 5, May 2020,pp 1906-1915, Published in (Scopus Index Journal)

8. J Eeshwar Ram, P Mohanaganga Raju, K S Sai Kumar, Pullela S S Pavan Kumar “Effectiveness of steel fiber and glass fiber with combination of manufacture sand and normal sand in Fresh and physical” International Journal of Advanced Science and Technology, ISSN: 2005-4238, IJASTVol. 29, No. 7, (May 2020), pp. 1265-1271 Published in (Scopus Index Journal)

9. V. Ramakrishna, S. Chandrika, O. Charmini, G. Sandhyarani and K. Ravalika “ A Study of Hydrological Parameters in Krishna District, and Andhra Pradesh” Test Engineering and Management ISSN: 0193-4120, Volume 83, 18th May 2020, Page No. 7962 - 7971 Published in (Scopus Index Journal)

10. B. Rama Krishna1, K. Harish Kumar, T. Mani Kumar, I. Likitha “Properties of GGBS Concrete Under Various Curing Conditions” International Journal of Emerging Trends in Engineering Research, ISSN 2347 – 3983, Volume 8. No. 4, April 2020,pp 1384-1387, Published in (Scopus Index Journal)

ARTICLES

3D PRINTING

3D printing is the computer-controlled sequential layering of materials to create three-dimensional shapes. In the construction industry,3D printing can be used to create construction components or to 'print' entire buildings. Construction 3D printing may allow, faster and more accurate construction as well as lowering labour costs and producing less waste.

3D printing in construction can either involve the use of a 3D printer attached to an arm which actively builds a project on-site or the use of printers in a factory which create components of a building project that are assembled later.

As a concept, 3D printing is not new – it was first developed in the 1980s. However, only in the last decade has the technology improved enough for it to become mainstream.

3D printers are not unlike your desktop inkjet printer. A software programme 'tells' the printer about the dimensions of the end product. The printer then injects material on a platform according to that plan. 3D printers often use liquid metals, plastics, cement and a variety of other materials which then cool or dry to form a structure. For 3D printing in construction, a CAD or BIM programme tells the 3D printer what it needs to print, and the machines then begin layering out levels of material according to the plan.

There is now solid evidence showing that 3D printing is credible and applicable in the construction sector, and it is likely that the technology will start to be seen more and more in the industry in the coming years.

ARTICLES

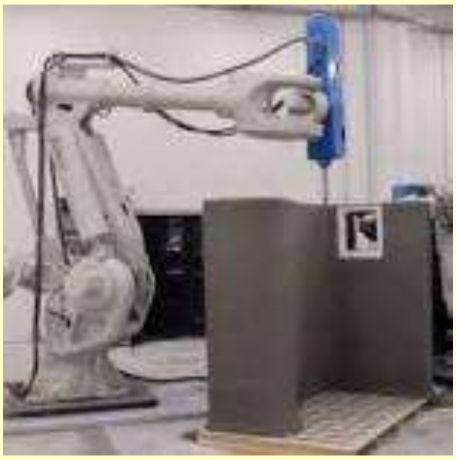
3D printing provides**:**

- **Zero waste construction**

3D printing has the potential to cut waste to almost zero. A 3D printer only uses the material required to print the structure – no more or less. This could translate into huge savings.

- **Time and cost reduction**

A 3D printer can work 24 hours per day, 7 days per week. This means construction projects could potentially be completed much faster, and some low skilled labour costs could be avoided.



- **Supports unusual designs**

One of the most appealing characteristics of 3D printers is their ability to create complex and unusual designs, including 'one-offs'. Because 3D printers work by layering up material, they can be programmed to create unusual shapes which would be much harder to build using traditional techniques.

- **Advantages**

1. Most building firms operate on relatively thin profit margins. The investment needed to use 3D printing designs on a widespread basis would be enormous.

2. 3D printed houses, offices, shops or other structures are often impressive to look at

3. 3D printers are good at following unique and interesting designs.

ARTICLES

THREE INNOVATIVE EXAMPLES

1. Dubai municipality office building, UAE

In December 2019, 3D printing robot firm Apis Cor announced it had completed the world's largest individual 3D printed building. The office block, built in the UAE, is 9.5 metres in height and has a floor area of 640 m2.

Apis Cor's 3D printer was moved around the open-air site by a crane as it built different parts of the structure.

2. Office of the Future, UAE

Another impressive 3D printed building in the UAE, the office of the future is a unique structure which is currently home to the emirate's Future Foundation.

For this building, the printing itself was done offsite, with all the parts printed in 17 days. Workers installed the whole building in just 48 hours.

3. 3D printed houses by Winsun, China

Chinese 3D printing firm winsun also uses factory-based 3D printers to construct human dwellings. The firm has created a handful of home designs, including a small apartment block. The design's users can quickly and cheaply print the parts before installing them on-site.

Compiled by
Saladi Deepthi
18761A0132

ARTICLES

CONNECTED HOMES

A **connected home** is networked to enable the interconnection and interoperability of multiple devices, services and apps, ranging from communications and entertainment to healthcare, security and home automation. These services and apps are delivered over multiple interlinked and integrated devices, sensors, tools and platforms. Connected, real-time, smart and contextual experiences are provided for the household inhabitants, and individuals are enabled to control and monitor the home remotely as well as within it.

The technologies behind the connected home can be grouped in the following categories:

- **Networking:** Familiar home networking technologies such as Wi-Fi, Bluetooth, as well as 3G and Long Term Evolution (LTE), are complemented with low-power consumption networking standards for devices and sensors that require low bandwidth and consume very little power, such as thermostats.
- **Media and Entertainment:** This category, which covers integrated entertainment systems within the household and includes accessing and sharing digital content across different devices, has proved to be the most prolific and contains some of the most mature technologies in the connected home.
- **Home Security/Monitoring and Home Automation:** The technologies in this category cover a variety of services that focus on monitoring and protecting the home as well as the remote and automated control of doors, windows, blinds and locks, heating/air conditioning, lighting and home appliances, and more.
- **Energy Management:** This category is tightly linked to smart cities and government initiatives, yet consumer services and devices/apps are being introduced at mass-market prices that allow people to track, control and monitor their gas/electricity consumption.
- **Healthcare, Fitness and Wellness:** Solutions and services around healthcare have proven slow to take off, because they have to be positioned within a health plan and sold to hospitals and health insurance companies. The fitness and wellness segment has strong and quickly developed ecosystems that range from devices to sports wares to apps, which integrate seamlessly with each other to create a strong customer experience.

ARTICLES

A connected generally comprises of:

- **Lighting Control**
- **Climate Control**
- **Security Systems**
- **Data Networking**
- **Multiroom Audio & Video**
- **Home Theater**

Enabled by the advancement in internet of things, automation and AI technologies, connected homes could improve our indoor living quality from various aspects, including indoor entertainment, energy saving, health, security and control, and so on. With the support of data analytic and aggregation technologies, the data collected from different devices could help build a comprehensive profile of the occupants' living style and the state of the property. This would allow occupants to be more informed of their living quality, and meanwhile, the anonymized data could feed into the wider urban network and help build a district/city profile to inform city planning and decision-making**.**

The practical scenarios are almost limitless as people choose to incorporate more and more devices into their personal home network and as devices learn to interface with one another. Significant savings in both time and money can be attributed to energy management, enhanced security, and chore automation. Connected home technology provides the opportunity to choose which devices connect to the internet opens the door to create customized living that adjusts to meet the needs of a family based on their preferences and usage patterns. Connected appliances, security systems, energy and temperature controls, and light bulbs are just some of the devices where potential can be unlocked and substantial value realized.

ARTICLES

Here's how it works

1. CONNECT:

Just a few lines of code connects devices to IoT platform, no heavy agents or proprietary silicon requirements necessary. This model allows any connected device to send data to Buddy, helping to gain intelligence from sensors already deployed, and ones that soon will be.

2. PROCESS:

Buddy can translate raw data into seamless connections to gain valuable insight through actionable business and customer intelligence. This includes functionality for custom analysis in the cloud, and two way communication between devices, or from your business systems back to the devices themselves.

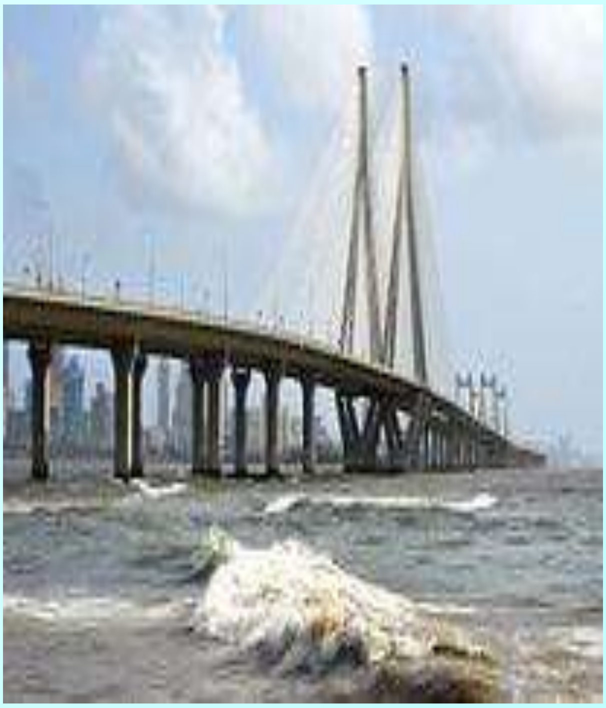
3. TRANSLATE:

Once data is normalized with device, it can be sent to a wide variety of business systems for rich visualization, connecting to machine to machine systems, or deep analysis with big data systems like Hadoop.

The Indian connected home market is expected to surpass US$ 9 Billion by 2025.With a penetration rate of 32.4% and an estimated total of 41.3 million connected homes, connected home popularity statistics show Americans favor home automation devices more than other nations. Second in line in terms of smart home penetration rates is China. There were 22.5 million smart homes in Europe by the end of 2017. The number of connected homes in Europe is expected to reach 84 million by 2022, with Germany, the UK, and France pushing the market forward.
Millennials, the generation that grew up with technology are unsurprisingly the most enthusiastic about smart house technology. In fact, most of them are willing to pay 20% more for a home with smart devices, smart home statistics state.

Compiled by
Saladi Deepthi
18761A0132

ENGINEERING MARVELS



- The Bandra–Worli Sea Link (officially known as Rajiv Gandhi Sea Link is a bridge that links Bandra in the Western Suburbs of Mumbai with Worli in South Mumbai. It is a cable-stayed bridge with pre-stressed concrete-steel viaducts on either side. It is a part of the proposed Western Freeway that will link the Western Suburbs to Nariman Point in Mumbai's main business district.
- The 1M bridge was commissioned by the Maharashtra State Road Development Corporation (MSRDC), and built by the Hindustan Construction Company. The first four of the eight lanes of the bridge were opened to the public on 30 June 2009.All eight lanes were opened on 24 March 2010.
- The sea-link reduces travel time between Bandra and Worli during peak hours from 20 to 30 minutes to 10 minutes. As of October 2009, BWSL had an average daily traffic of around 37,500 vehicles.

DO YOU KNOW?

Bandra Worli Sea Link was conceptualized in the late ’90s to be India’s first eight-lane, cable-stayed freeway over the open sea. However, it faced several Public Interest Litigations from fishermen and environmentalists who were against the construction of the sea link. Despite moving pleas to the Supreme Court which got dismissed, there were several changes in the design that led to the increase in cost of construction of this revolutionary bridge. The final costs ballooned to Rs 16.5 billion from Rs 13.06 billion, Also Read - Beat The Heat With a Visit to The Coolest Places in Maharashtra

Though the construction of the sea link started in 2000, it was completed only in 2010 after being opened to public use in 2009. The completion of the sea link was delayed by five years. It was named after Rajiv Gandhi, a former Prime Minister of India

ENGINEERING MARVELS

HISTORY

- Northern viaduct of BWSL in the foreground seen against the Worli skyline. View from Bandra Fort
- Sunset View of Bandra Worli Sealink from Dadar Chowpatty spanning over Mahim Bay
- Mahim Causeway was the only road connecting the western suburbs to Mumbai's central business district. This north-southwestern corridor became a bottleneck and was highly congested at peak hours. The Western Freeway project was proposed to span the entire western coastline of Mumbai to ease congestion. The Bandra–Worli Sea-Link, a bridge over Mahim Bay, was proposed as the first phase of this freeway system, offering an alternative route to the Mahim Causeway.
- The Mujeeb Acharwala Bridge connects the intersection of the Western Express Highway and Swami Vivekanand Road in Bandra to the Khan Abdul Ghaffar Khan Road in Worli. From Worli Sea face, it connects to Mumbai's arterial Annie Besant Road.
- The project was commissioned by the Maharashtra State Road Development Corporation Limited (MSRDC). The contract for construction was awarded to the Hindustan Construction Company (HCC), with project management led by the UK offices of Dar Al-handasah .
- The foundation stone was laid in 1999 by Bal Thackeray. The original plan estimated the cost at ₹6.6 billion (US$93 million) to be completed in five years. But the project was subject to numerous public interest litigations, with the 5-year delay resulting in the cost escalating to ₹16 billion (US$220 million),with the additional interest cost alone accounting for ₹7 billion (US$98 million).

Planning

- The overall project consisted of five parts, contracted separately to accelerate the overall schedule.
- **Package I**: Construction of a flyover over Love Grove junction in Worli
- **Package II**: Construction of a cloverleaf interchange at the intersection of the Western Express Highway and S.V. Road in Bandra
- **Package III**: Construction of solid approach road from the interchange to the Toll Plaza on the Bandra side along with a public promenade
- **Package IV:** Construction of the central cable-stayed spans with northern and southern viaducts from Worli to the Toll Plaza at the Bandra end
- **Package V**: Improvements to Khan Abdul Gaffar Khan Road
- **Package IV:** was the main phase, with the other packages providing supporting infrastructure.

ENGINEERING MARVELS

Geology

- Surveys of the seabed under the planned route were conducted before the bridge design commenced. The marine geology underneath the bridge consists of basalts, volcanic tuffs and breccias with some intertrappean deposits. These are overlain by completely weathered rocks and residual soil. The strength of these rocks range from extremely weak to extremely strong and their conditions range from highly weathered and fractured, to fresh, massive and intact. The weathered rock beds are further overlain by transported soil, calcareous sandstone and thin bed of coarse grained conglomerate. The top of these strata are overlain by marine soil layer up to 9m thick consisting of dark brown clay silt with some fine sand overlying weathered, dark brown basaltic boulders embedded in the silt.

Design

- BWSL was designed as the first cable-stayed bridge to be constructed in open seas in India. Due to the underlying geology, the pylons have a complex geometry and the main span over the Bandra channel is one of the longest spans of concrete deck attempted. Balancing these engineering complexities with the aesthetics of the bridge presented significant challenges for the project.

- The superstructure of the viaducts were the heaviest precast segments to be built in India. They were built using a span-by-span method using overhead gantry through a series of vertical and horizontal curves.

- The 20,000 tonne Bandra-end span of the bridge deck is supported by stay cables within a very close tolerance of deviations in plan and elevation.

- The Bandra–Worli Sea Link was the first infrastructure project in Mumbai to use seismic arresters. These will enable it to withstand earthquakes measuring up to 7.0 on the Richter scale.

Structure

BWSL consists of twin continuous concrete box girder bridge sections for traffic in each direction. Each bridge section, except at the cable-stayed portion, is supported on piers typically spaced 50 meters (160 ft) apart. Each section is designed to support four lanes of traffic with break-down lanes and concrete barriers. Sections also provide for service side-walks on one side. The bridge alignment is defined with vertical and horizontal curves.

- The bridge consists of three distinct parts: the north end viaduct, the central cable-stayed spans and the south end viaduct. Both the viaducts used precast segmental construction. The cable-stayed bridge on the Bandra channel has a 50m-250m-250m-50m span arrangement and on the Worli channel it has a 50m-50m-150m-50m-50m span arrangement.

ENGINEERING MARVELS

Cable-stayed spans

The cable-stayed portion of the Bandra channel is 600 meters (2,000 ft) in length between expansion joints and consists of two 250-metre cable supported main spans flanked by 50 meters conventional approach spans. A center tower, with an overall height of 128 meters above pile cap level, supports the superstructure by means of four planes of cable stay in a semi-harp arrangement. Cable spacing is 6.0 meters along the bridge deck.

- The cable-stayed portion of the Worli channel is 250 meters (820 ft) in length between expansion joints and consists of one 150 meters cable supported main span flanked on each side by two 50 meters conventional approach spans. A center tower, with an overall height of 55 meters, supports the superstructure above the pile cap level by means of four planes of cable stay in a semi-harp arrangement. Cable spacing here is also 6.0 meters along the bridge deck.
- The superstructure comprises twin precast concrete box girders with a fish belly cross sectional shape, identical to the approaches. A typical Pre-Cast segment length is 3.0 meters with the heaviest superstructure segment approaching 140 tones. Balanced cantilever construction is used for erecting the cable supported superstructure as compared to span-by-span construction for the approaches. For every second segment, cable anchorages are provided.
- A total of 264 cable stays are used at Bandra channel with cable lengths varying from approximately 85 meters to nearly 250 meters. The tower is cast in-situ reinforced concrete using the climbing form method of construction. The overall tower configuration is an inverted "Y" shape with the inclined legs oriented along the axis of the bridge. Tower cable anchorage recesses are achieved by use of formed pockets and transverse and longitudinal bar post-tensioning is provided in the tower head to resist local cable forces.
- A total of 160 cable stays are used at Worli channel with cable lengths varying from approximately 30 meters minimum to nearly 80 meters maximum. Like the Bandra channel, the tower here is also cast in-situ reinforced concrete using the climbing form method of construction but the overall tower configuration is "I" shape with the inclined legs. Similarly, tower cable anchorage recesses are achieved by use of formed pockets.
- The foundations for the main tower comprise 2-metre-drilled shafts of 25-metre length each. Cofferdam and tremie seal construction have been used to construct the six-metre deep foundation in the dry.

Compiled by ,
K.SUBRAMANYAM
18761A0118

Millau Viaduct

The Millau Viaduct (French: Viaduc de Millau, is a multi-span cable-stayed bridge completed in 2004 across the gorge valley of the Tarn near Millau in Southern France. The design team was led by engineer Michel Virlogeux and English architect Norman Foster. As of September 2020, it is the tallest bridge in the world, having a structural height of 336.4 meters (1,104 ft).

The Millau Viaduct is part of the autoroute axis from Paris to Béziers and Montpellier. The cost of construction was approximately € 394 million ($424 million).It was built over three years, formally inaugurated on 14 December 2004,and opened to traffic two days later on 16 December. The bridge has been consistently ranked as one of the greatest engineering achievements of modern times, and received the 2006 Outstanding Structure Award from the International Association for Bridge and Structural Engineering

History:

In the 1980s, high levels of road traffic near Millau in the Tarn valley were causing congestion, especially in the summer due to holiday traffic on the route from Paris to Spain. A method of bypassing Millau had long been considered, not only to ease the flow and reduce journey times for long-distance traffic, but also to improve the quality of access to Millau for its local businesses and residents. One of the solutions considered was the construction of a road bridge to span the river and gorge valley. The first plans for a bridge were discussed in 1987 by CETE, and by October 1991 the decision was made to build a high crossing of the Tarn by a structure of around 2,500 meters (8,200 ft) in length. During 1993–1994, the government consulted with seven architects and eight structural engineers. During 1995–1996, a second definition study was made by five associated architect groups and structural engineers. In January 1995, the government issued a declaration of public interest to solicit design approaches for a competition.

In July 1996 the jury decided in favor of a cable-stayed design with multiple spans, as proposed by the Sogelerg consortium led by Michel Virlogeux and Norman Foster. The decision to proceed by grant of contract was made in May 1998; then in June 2000, the contest for the construction contract was launched, open to four consortia. In March 2001, Eiffage established the subsidiary Compagnie Eiffage du Viaduc de Millau (CEVM), and was declared winner of the contest and awarded the prime contract in August

Millau Viaduct

Construction:

- Two weeks after the laying of the first stone on December 14, 2001, the workers started digging the deep shafts. There were four shafts per pylon; 15 meters (49 ft) deep and 5 meters (16 ft) in diameter, assuring the stability of the pylons. At the bottom of each pylon, a tread of 3–5 meters (10–16 ft) in thickness was installed to reinforce the effect of the deep shafts. The 2,000 cubic meters (2,600 cu yd) of concrete necessary for the treads was poured at the same time.
- In March 2002, the pylons emerged from the ground. The speed of construction then rapidly increased. Every three days, each pylon increased in height by 4 meters (13 ft). This performance was mainly due to sliding shuttering. Thanks to a system of shoe anchorages and fixed rails in the heart of the pylons, a new layer of concrete could be poured every 20 minutes

Launching:

- The bridge road deck was constructed on plateaus at both ends of the viaduct, and pushed onto the pylons using bridge launching techniques. Each half of the assembled road deck was pushed lengthwise from the plateaus to the pylons, passing across one pylon to the next. During the launching, the road deck was also supported by eight temporary towers, which were removed near the end of construction. In addition to hydraulic jacks on each plateau pushing the road decks, each pylon was topped with a mechanism on top of each pylon that also pushed the deck. This mechanism consisted of a computer-controlled pair of wedges under the deck manipulated by hydraulics. The upper and lower wedge of each pair pointed in opposite directions.
- The wedges were hydraulically operated, and moved repeatedly in the following sequence:

1. The lower wedge slides under the upper wedge, raising it to the roadway above, and then forcing the upper wedge still higher to lift the roadway
2. Both wedges move forward together, advancing the roadway a short distance
3. The lower wedge retracts from under the upper wedge, lowering the roadway and allowing the upper wedge to drop away from the roadway; the lower wedge then moves back all the way to its starting position. There is now a linear distance between the two wedges equal to the distance forward the roadway has just moved.
4. The upper wedge moves backward, placing it further back along the roadway, adjacent to the front tip of the lower wedge and ready to repeat the cycle and advance the roadway by another increment.

- The launching advanced the road deck at 600 millimeters (24 in) per cycle which was roughly four minutes long.
- The mast pieces were driven over the new road deck lying down horizontally. The pieces were joined to form the one complete mast, still lying horizontally. The mast was then tilted upwards, as one piece, at one time in a tricky operation. In this way, each mast was erected on top of the corresponding concrete pylon. The stays connecting the masts and the deck were then installed, and the bridge was tensioned overall, and weight tested. After this, the temporary pylons could be removed.

Millau Viaduct

Construction records:

The construction Millau Viaduct broke several records

•The highest pylons in the world: pylons P2 and P3, 244.96 meters (803 ft 8 in) and 221.05 metres (725 ft 3 in) in height respectively, broke the French record previously held by the Tulle and Verrières viaducts (141 meters or 463 feet), and the world record previously held by the Kochertal Viaduct (Germany), which is 181 meters (594 ft) at its highest;
•The highest bridge tower in the world: the mast atop pylon P2 peaks at 336.4 meters (1,104 ft);
•The highest road bridge deck in Europe, 270 meters (890 ft) above the Tarn at its highest point; it is nearly twice as tall as the previous tallest vehicular bridges in Europe, the Europabrücke in Austria and the Italia Viaduct in Italy.
•Since opening in 2004, the deck height of Millau has been surpassed by several suspension bridges in China, including Sidu River Bridge, Baling River Bridge, and two spans (Beipan River Guanxing Highway Bridge and Beipan River Hukun Expressway Bridge) over the Beipan River. In 2012, Mexico's Baluarte Bridge surpassed Millau as the world's highest cable-stayed bridge. The Royal Gorge suspension bridge in the U.S. state of Colorado is also higher, with a bridge deck approximately 291 meters (955 ft) over the Arkansas River

Location:

The Millau Viaduct is on the territory of the communes of Millau and Creissels, France, in the department of Aveyron. Before the bridge was constructed, traffic had to descend into the Tarn valley and pass along the route national N9 near the town of Millau, causing much traffic congestion at the beginning and end of the July and August holiday season. The bridge now traverses the Tarn valley above its lowest point, linking two limestone plateaus, the Causse du Larzac and the Causse Rouge [fr], and is inside the perimeter of the Grands Causses regional natural park.[citation needed]
The Millau Viaduct forms the last link of the existing A75 autoroute (known as "la Méridienne), from Clermont-Ferrand to Béziers. The A75, with the A10 and A71, provides a continuous high-speed route south from Paris through Clermont-Ferrand to the Languedoc region, thence to Spain, considerably reducing the cost and time of vehicle traffic travelling along this route. Many tourists heading to southern France and Spain follow this route because it is direct and without tolls for the 340 kilometres (210 mi) between Clermont-Ferrand and Béziers, except for the bridge.[citation needed]
The Eiffage group, which constructed the Viaduct also operates it, under a government

Millau Viaduct

Structure:

Pylons and abutments:

Each of the seven pylons is supported by four deep shafts, 15 metres (49 ft) deep and 5 metres (16 ft) in diameter.

Heights of the piers						
P1	P2	P3	P4	P5	P6	P7
94.501 m (310 ft 0.5 in)	244.96 m (803 ft 8 in)	221.05 m (725 ft 3 in)	144.21 m (473 ft 2 in)	136.42 m (447 ft 7 in)	111.94 m (367 ft 3 in)	77.56 m (254 ft 6 in)

The abutments are concrete structures that provide anchorage for the road deck to the ground in the Causse du Larzac and the Causse Rouge

Road deck:

The metallic road deck, which appears very light despite its total mass of around 36,000 tones (40,000 short tons), is 2,460 meters (8,070 ft) long and 32 meters (105 ft 0 in) wide. It comprises eight spans. The six central spans measure 342 meters (1,122 ft), and the two outer spans are 204 meters (669 ft). These are composed of 173 central box beams, the spinal column of the construction, onto which the lateral floors and the lateral box beams were welded. The central box beams have a 4 meters (13 ft 1 in) cross-section, and a length of 15–22 meters (49–72 ft) for a total weight of 90 metric tons (99 short tons). The deck has an inverse airfoil shape, providing negative lift in strong wind conditions.

Masts:

The seven masts, each 87 meters (285 ft) high, and weighing around 700 tones (690 long tons; 770 short tons), are set on top of the concrete pylons. Between each of them, eleven stays (metal cables) are anchored, providing support for the road deck.

Road surface:

To allow for deformations of the metal road deck under traffic, a special surface of modified bitumen was installed by research teams from Apia (company) . The surface is somewhat flexible to adapt to deformations in the steel deck without cracking, but it must

BY
K.SUBRAMANYAM
18761A0118

TRUE FACTS

I. In the 18th century, the term ‘civil engineering’ came into use to describe engineering work that was performed by civilians for nonmilitary purposes.

II. Concrete is the second most consumed material on the planet by humans where as the first one is water.

III. The empire state building in Newyork city is designed to be a lighting rod but now it is a office building.

IV. If you’ve ever tried to beat the summer heat by going down a waterslide, you can thank a civil engineer .They were able to determine the right ratio of water to flume, so you can slide instead of get stuck.

V. Until modern times there was no clear distinction between civil engineering and architecture, and the terms engineer and architect often referred to the same person.

QUIZ

1. What type of clay is selected for tile manufacture?
   a) Slightly wet
   b) Sticky
   c) Dry
   d) Rich

2. What should be observed when a brick is broken?
   a) Parallel strata
   b) Homogeneous surface
   c) Pores
   d) Brown colour

3. __________ base is generally used for priming coat to new wood work?
   a) Antimony white
   b) Titanium dioxide
   c) Aluminum powder
   d) Red lead

4. Which type of glass is used in the manufacture of artificial gems, bulbs, lenses, etc?
   a) Soda-lime glass
   b) Special glass
   c) Potash-lead glass
   d) Common glass

5. Recycled crumb rubber can be used in:
   a) Plastering
   b) Mortar
   c) Paints
   d) Concrete

ANSWERS
1. a
2. b
3. c
4. c
5. d

QUIZ

1. I have branches, but no fruit, trunk or leaves. What am I?

2. What has many keys but can't open a single lock?

3. If you throw a blue stone into the Red Sea, what will it become?

4. You can you serve it, but never eat it? What is it?

5. What has hands but can't clap?

6. What is so delicate that saying its name breaks it?

ANSWERS

1. A bank
2. A piano
3. wet
4. A tennis ball
5. A clock
6. Silence

STUDENT ART

By
Y. Suvarchala
18761A0143