Vidya Vikas Education Trust's
Universal College of Engineering
Accredited with B+ Grade by NAAC
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Gujarati Linguistic Minority Institution

ACES
Association of Civil Engineering Students

JULY 2022
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THE BENCHMARK

Editor's Desk

We are pleased to present July 2022 edition of Benchmark. In this edition you will find an article on Bandra-worli Sealink and other contribution by Students and Faculty members of Department of Civil Engineering highlighted in the month of June. News update and departmental activities are the part along with Canva.

Department Vision:

- To excel in every area of Civil Engineering, inculcate research oriented study to explore hidden talent.
- Providing Opportunity to display creativity, out of the box thinking & innovativeness, aimed at providing cutting edge technology for sustainable development.

Department Mission:

- Providing qualified, motivated faculties to deliver the content using updated teaching methodology, inviting industry experts from various areas to disseminate subject knowledge in Civil Engineering.
- Motivating students to undertake the Research Oriented studies, participate in competitions at all levels, grasping new techniques and methods which can be improved on further.
- Conducting and participating in seminars, workshops and training programs with a view to make the students industry ready and improve their employability factor for global career ahead.
- To create quality professionals capable of planning, designing and analytical skills for better infrastructural development in the field of Civil Engineering.

BANDRA–WORLI SEA LINK

The **Bandra–Worli Sea Link** (officially known as **Rajiv Gandhi Sea Link**) is a 5.6 km long, 8- lane wide 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 was planned as a part of the proposed Western Freeway that would link the Western Suburbs to Nariman Point in Mumbai's main business district, but is now planned to become part of the Coastal Road to Kandivali. The 1M bridge was commissioned by the Maharashtra State Road Development Corporation (MSRDC), and built by the Hindustan Construction Company.

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. BWSL (Bandra Worli Sea Link) 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 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. The foundations for the BWSL's cable-stayed bridges consist of 120 reinforced concrete piles of 2,000 millimeters (6.6 ft) diameter. Those for the viaducts consist of 484 piles of 1,500 millimeters (4.9 ft). These 604 piles were driven between 6m and 34m into the substrate in geotechnical conditions that varied from highly weathered volcanic material to massive high strength rocks.

The largest pylons for the bridge consist of diamond shaped 128 meters (420 ft) high concrete tower featuring flaring lower legs, converging upper legs, a unified tower head housing the stays and a continuously varying cross section along the height of tower. The bridge's pylon towers gradually decrease in cross-section with height. They have horizontal grooves every 3m in height, which permitted inserts. Vertical grooves in the circular sections require special form liners, as well as require attention for de-shuttering. The tower legs are inclined in two directions, which presented challenges in alignment and climbing of soldiers. Construction joints were permitted at 3m intervals only. The BWSL is not accessible to pedestrians, and was not designed for them, according to the MSRDC's Satish Gavai. Two-wheeled, including motorbikes and pedal bicycles, and three-wheeled vehicles are prohibited as well. The capacity of the bridge is restricted due to a bottleneck at the Worli (south) end of the bridge. While the majority of the 4.7 km (2+⅞ mi) length has four lanes in each direction, the Worli end has only two lanes for a length of approximately 1.2 km (¾ mi). This leads to backlogs for southbound traffic, especially during morning peak hours.

-BY KALPITA CHAFEKAR
B.E. CIVIL

To know more about Bandra Worli Sea Link, Scan the QR Code

RETROFITTING OF RCC STRUCTURE

The process of retrofitting and strengthening of the reinforced concrete structure is a rapidly growing field of engineering. One of the most difficult task civil engineering is strengthening of reinforced concrete structures. The need for retrofitting of building arises, if the building is damaged structurally and old buildings that have not maintained for a long period of time. The reasons which cause damage in a structure are Deficiencies, Design Deficiencies, Construction Deficiencies, Destresses due to chemical Attack. These Destressed structures need to be brought in line, level and required strength so that it can be put to service load without endangering its safety and utility. It is crucial to differentiate to differentiate among the terms retrofit, repairs and rehabilitation of a structure. All three phrase refer to modification carried out on a structure, but in distinctive context. 'Repairs' is carefully used to describe any intervention that is nonstructural in nature. On the other hand, both 'Retrofit' and 'Rehabilitation' refer to structural intervention aimed towards strengthening the structure. The difference between the two terms is very fine. Rehabilitation targets at regaining the original strength of a structure, which has been damaged or deteriorated. Retrofit aims to strengthen a building to fulfil the current codes 2 for seismic design. It is generally expected that concrete construction will provide trouble free service throughout its intended design life. In many situations these expectations are not met due to structural deficiency, material deterioration, unforeseen overloading or Physical damage. The above-mentioned causes are the reasons for premature material deterioration. Concrete structure demands proper treatment in the form of regular maintenance, buildings get neglected for several years without any consideration leading to waste stagnation, paint peelings, deterioration plaster, fungal growth, propagation of cracks and spalling cover concrete. Moisture penetration into reinforced concrete promotes the process of corrosion which leads to further damage of the concrete cover. Seismic Loads are also one of the most important reasons which causes major distress in a structure. Except in most extreme cases, the structure requires appropriate retrofitting techniques to meet its functional requirements. It has been noted that most of the damaged building can be reused safely, if they are made structurally stable by the use of some retrofitting techniques. This proves to be a better economically feasible option and caters to the problem of immediate shelter rather than replacing the buildings. In fact, retrofitting of building has shown to be more economically efficient in comparison to demolition and reconstruction even if the structure is severely damaged.

Construction activity in India has grown exponentially since the 1950s without matching the availability of quality inputs, in terms of materials and skilled workers. The gap between the planned quality achieved quality continues to widen. As a consequence, the factors contributing to damages/distresses in buildings have become inevitable right from the construction point. These are often are concealed beneath exterior renderings, and it takes time for the flaw manifest. Construction documents provide adequate specifications and guidelines for performing good quality works. However, due to lack of understanding of their significance by the filed engineers, they remain as written document without achieving the desired level of outcomes. Measure of quality is determined by the standard cube test results. Whereas little attention is paid to factors such as the method of placing, compaction and curing of concrete, which have a significant influence on the quality achieved in the hardened concrete. On several occasion, there is no correlation in the quality of concrete as placed and hardened in position to the cube test results, that are used as quality control measures.

Need of Retrofitting Concrete Structure

As time passes many environmental factors going on around impact the structure. Out of all these factors, the most damaging is an earthquake that disturbs the internal structure of the building, and thus gradually building

starts losing its strength and stability. As a result, the structure becomes unsafe for future use and might cause massive loss

The level of deterioration caused to the concrete element structure is occurring at an alarming rate. It has been confirmed that even if all the specific building code is followed still there is a high risk of deterioration of concrete element and corrosion of reinforcement.

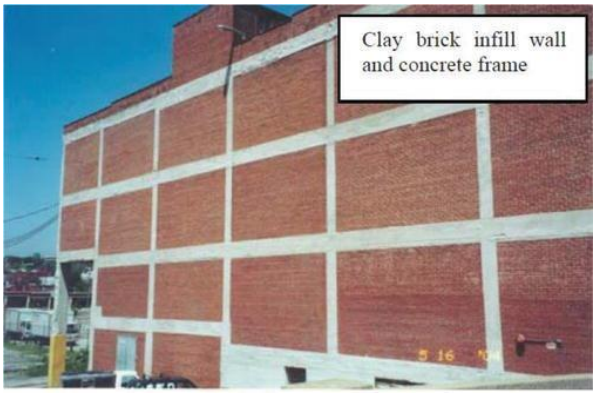
Steel corrosion is considered as one of the severe causes behind the deterioration of reinforced concrete element and this could create cracks or reduce the effective area of the reinforcement, spalls the concrete cover, and might lead to collapse. There are a variety of cases when dealing with damages. In case of any private or public sector like any office or house if the structure is damaged to an extreme level

Types of Retrofitting

- **Local Retrofitting Techniques**

Column Beam Joint Jacketing

Beam Jacketing



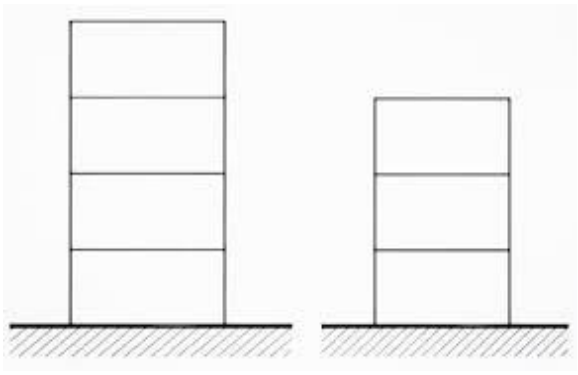
Adding Infill Wall

Foundation Jacketing

Column Jacketing

- **Global Retrofitting Techniques**

Adding Shear Wall



Mass Reduction

Adding Shear Wall

Reinforced Concrete Structures

Two important methods that can be carried on improving concrete structures are these: –

- Adding New Structural Elements
- Strengthening Existing Elements

Masonry Structure
Other methods include Retrofitting through roofs, doors, and windows

Advantages of Retrofitting

1. Increases the life of the building.
2. Is economical.
3. It is pocket friendly
4. Helps in increasing stability and sustainability
5. Prepares the building to bear different weather conditions
6. Helps in strengthening and enhancement of the structure.

Disadvantages of Retrofitting

1. Small irresponsibility can cause further damage.
2. Chances are that it can damage historical buildings.
3. Need critical and expert analysis before Retrofitting.
4. Requires expert analysis before proceeding to retrofit.

PROF. USAMA DIWAN
Assistant Prof.
Dept. of Civil Engg; UCoE

CROSSWORD

R W S P L Q W R Z O H C S B J W I H N Z D M I R
R R W F N G O D Y E V R U S X U A X Q X I R S W
C A H N G T G P N R L D V H G Z S N F Z D E F C
A H Y Y C Y H N Z R S W D K R Z V L B X I H K M
V J T E S A L A I Q H R E T E M O N I L C N I P
U N S P S L R P V D K P A E U Q R O T S B G S L
T S E E H W N W U P L W Y B C E R H H E D T S Z
I R Z W T T C I K S L O L W N W E O V N R E G F
L F K P T D I F X F Z A M N M J V V S U E G A N
Z X E C A O Z O N W Q E M Q G S E B C N S V A X
U Y D R W B N F Q K W O I H L U L T S Z N Y Z N
Q L V Q U K Z I P U L L E Y W G U S D I E M T T
R I K O Q S O N A Q U Y K O D R M V C E C N B C
M O D E L M S A Y N H W D K E N Z A M R I J M Q
F N H Z D Y C E J L J Q F E E L N I D R L F A M
J O Y Y N E S U R Y M S H C R X V R P B O G G N
F I F W D E G E V P O P T I C S Z E U U P E Y M
W S K I H R Y P F V C G O X Q M U M Q H O T I Q
O N S Q L L A I W G G W U W X L D N L M L K H B
E E Q X V G O U G A N S L H B H G C E G L H B X
G T T Y Q P A E L T M Q A D A Q G T I D F E N G
Z L W H Y L P K I I U N K X B P R R N F F X M R
G Z E P T R R V P X C P I P R Y M S N H O T Y V
R M Z X D P V G U Y M S K O I R G J V A E U V B

blueprint
Lever
Newtonian
Pulley
Tension

Geometry
license
Optics
sector
Torque

hydraulics
model
Phase
structure

Inclinometer
Molding
Pressure
Survey

News Bulletin

India's new rules may reduce online sales by $46bn by 2022: Report

India's new foreign investment restrictions for e-commerce sector could reduce online sales by $46 billion by 2022, a draft report by PwC stated. They could also affect job creation and reduce taxes collected, it added. E-commerce marketplaces have been barred from selling products of companies in which they have stake or push sellers to sell exclusively on their platforms.

Anti-encroachment drive carried out on ₹65 cr-land in Greater Noida

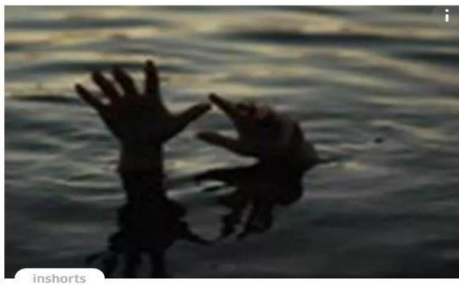
Greater Noida Industrial Development Authority (GNIDA) on Monday carried out an anti-encroachment drive on land worth ₹65 crore, officials said. Five bulldozers were used during the drive, which went on for four hours. "People had constructed boundary walls in empty plots covering large portions...The identities of the colony residents are unknown," GNIDA public relations officer said.

Israel begins constructing 45-km border wall in northern West Bank

Israel has begun constructing a 45-km-long border wall in the northern West Bank to replace its old barrier fence, said the Israeli Defence Ministry. The wall, which is 30 feet high, will stretch from the Palestinian village of Salem to the north of Tulkarm city, the ministry added. The project was approved by the Israeli government in April.

Construction of cable-stayed bridge in Rajasthan complete, pic released

Union Road Transport and Highways Minister Nitin Gadkari has announced that the project for the construction and maintenance of a cable-stayed bridge across river Chambal on Rajasthan's Kota Bypass has been completed. Gadkari added that the 1.4-km-long bridge, built with a capital expenditure worth ₹214 crore, is capable of tackling extreme traffic situations and handling heavy rainfall and winds.



4 kids drown in rainwater-filled pit dug for road construction in Odisha

Four children drowned in a rainwater-filled pit which had been dug up for road construction work in Odisha's Koraput on Thursday, police said. The incident occurred while the children were playing near the pit, police added. The local residents claimed that the incident took place due to the contracting company's negligence. The bodies were recovered and sent for post-mortem.

DEPARTMENTAL ACTIVITIES

YOGA DAY

21st June is the day we observe as the international yoga day. We all know, it was an initiative that was taken by our respected Prime Minister, Narendra Modi, keeping in mind the importance of Yoga in the life of every individual. Yoga, a process to achieve mindfulness and a healthy lifestyle should be included in everyone's life. It is a form of body relaxation that is suitable for all age groups. A process to achieve peace of mind, a process to achieve a calm state, a process to provide the body some form of relaxation can all be fulfilled by yoga.

To Commemorate this auspicious occasion, Yoga Day was organized at Universal college of engineering by NSS volunteer involving all NSS volunteers, teaching faculties and other beneficiaries.

The Yoga Session was conducted by Prof. Rajesh Dubey emphasizing the importance of Yoga in our day today life to boost our immune system and to relieve our stress, after which various asanaas were performed by the participates. The session proved to be a stress buster and reminder of our great heritage

WORLD ENVIROMENT DAY

World Environment Day (WED) is celebrated on 5 June every year, and is the United Nations' principal vehicle for encouraging awareness and action for the protection of the environment. First held in 1974, it has been a flagship campaign for raising awareness on environmental issues emerging from marine pollution, human overpopulation, and global warming, to sustainable consumption and wildlife crime. World Environment Day has grown to become a global platform for public outreach, with participation from over 143 countries annually. Each year, WED has provided a new theme that major corporations, NGOs, communities, governments and all celebrities worldwide adopt to advocate environmental causes.

"What we are doing to the forest of the world is but a mirror reflection of what we are doing to ourselves and to one another"
. Mahatma Gandhi.

PLACEMENTS 2022

ACHIEVEMENT

Asst. Engineer Grade B
Water resources Department
Through MPSC Civil Engineering
Exam 2019 (Declared on June 2022)

Shortlisted for
INDIAN ARMY

FACULTY ACHIEVEMENT

Department of Civil Engineering is extremely proud that Prof. Asir Khan has been appointed as the project guide at graduate level (AMIE) by 'The Institution of Engineers (India)'. The department appreciates your sincere efforts and congratulates you for achieving this milestone. We wish you all the success in your future endeavors.

The Institution of Engineers (India)
AN ISO 9001 : 2008 CERTIFIED ORGANISATION
(ESTABLISHED 1920, INCORPORATED BY ROYAL CHARTER 1935)
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QUOTE OF THE MONTH