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Gujarati Linguistic Minority Institution

ACES
Association of Civil Engineering Students

MARCH 2022
Vol. 4 | Edition 9

THE BENCHMARK

Editor's Desk

We are pleased to present March 2022 edition of Benchmark. In this edition you will find an article on New Valley Project and other contribution by Students and Faculty members of Department of Civil Engineering highlighted in the month of February. 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.

NEW VALLEY PROJECT

The New Valley Project or Toshka Project consists of building a system of canals to carry water from Lake Nasser to irrigate part of the sandy wastes of the Western Desert of Egypt, which is part of the Sahara Desert. In 1997, the Egyptian government decided to develop a new valley (as opposed to the existing Nile Valley) where agricultural and industrial communities would develop. It has been an ambitious project which was meant to help Egypt cope with its rapidly growing population.

The canal inlet starts from a site 8 km to the north of Toshka Bay (Khor) on Lake Nasser. The canal is meant to continue westwards until it reaches the Darb el-Arbe'ien route, then northwards along the Darb el- Arbe'ien to the Baris Oasis, covering a distance of 310 km. But as of April 2012, the canal is still 60 km short of the Baris Oasis. The Mubarak Pumping Station in Toshka is the centerpiece of the project and was inaugurated in March 2005. It pumps water from Lake Nasser to be transported by way of a canal through the valley, with the idea of transforming 2340 km² (588,000 acres) of desert into agricultural land. The Toshka Project has now been revived by President Abdel Fattah el-Sisi. Half of the land will be given to college graduates, 1 acre each, funded by the Long Live Egypt Fund.

The essential problem is that the Western Desert's high saline levels and the presence of underground aquifers in the area act as a major obstacle to any irrigation project. As the land is irrigated, the salt would mix with the aquifers and would reduce access to potable water. There is also the difficulty that the clay minerals found in the soil are posing technical problems to the big wheeled structures moving around autonomously to irrigate the land. Often their wheels get stuck in a little bowl created by wet clay that dried, and the irrigation machines come to a standstill. The only objective met up to April 2012 is the diversion of water from Lake Nasser into what little of the Sheikh Zayed Canal has been built.

The Toshka Lakes are a by-product of the rising level of Lake Nasser and lie in the same general region as much of the New Valley Project.

-BY KENIL BHADESIA
B.E. CIVIL

DID YOU KNOW

The purpose of the project was to develop a new urban center and increase the country's agricultural production to support its growing population.

To know more about New Valley Project, Scan the QR Code

EPS Geo Foam Construction

Expanded polystyrene (EPS) geofoam has been used as a geotechnical material since the 1960s. EPS geofoam is approximately 1% the weight of soil and less than 10% the weight of other lightweight fill alternatives. As a lightweight fill, EPS geofoam reduces the loads imposed on adjacent and underlying soils and structures. EPS geofoam is not a general soil fill replacement material but is intended to solve engineering challenges. The use of EPS typically translates into benefits to construction schedules and lowers the overall cost of construction because it is easy to handle during construction, often without the need for special equipment, and is unaffected by occurring weather conditions. In addition, EPS geofoam can be easily cut and shaped on a project site, which further reduces jobsite challenges. EPS geofoam is available in numerous material types that can be chosen by the designer for a specific application. Its service life is comparable to other construction materials and it will retain its physical properties under engineered conditions of use.

Expanded polystyrene is created in a two-stage, molded bead process. EPS geofoam is produced in blocks that can be cut into various shapes and sizes - and a range of compressive resistances - to suit specific project needs. As an engineered product, it can be produced to obtain the required compressive resistance. EPS geofoam density, only about 1% that of soil and rock, is controlled during the manufacturing process, making it a superior, ultra-lightweight fill material that significantly reduces the stress on underlying subgrades. The lighter load can reduce settlements and can improve stability against bearing and slope failures.

Fig: Application of EPS Geo-Foam in transportation industry

(Source:Dept. of Civil and Environmental Engineering,University of Utah)

Properties of EPS Geofoam

1. **Durability:** Durability of geosynthetics in general has been a subject of great interest in recent years. Overall, the durability of EPS and XPS geofoams is excellent. Typically, the only concern with EPS and XPS geofoams is that they be protected from gasoline and similar petroleum hydrocarbon liquids with a geomembrane or similar barrier in applications where there is a potential for a fuel spill (e.g., road embankments)
2. **Thermal Insulation**: EPS and XPS were invented circa 1950 primarily to provide thermal insulation. Foams are very efficient thermal insulators because they are approximately 98% to 99% gas by volume and gases are typically very efficient thermal insulators. Therefore, it is the first known application call geofoam was as thermal insulation of roads, railways, and airfield pavements (to prevent or at least reduce seasonal frost heaving or retard thawing in permafrost areas); the below-ground portions of buildings (to reduce seasonal heating requirements); and beneath on-grade storage tanks containing cold liquids (one of the few applicationswhere glass foam is used almost exclusively).
3. **Lightweight Fill**: Geofoams, especially polymeric ones, are unique materials they have a density only about 1% to 2% of the density of soil and rock are sufficiently strong to support many types of loads encountered in geotechnical applications. The earliest function of geofoam that was developed was its use as a lightweight fill material in a wide variety of "earthworks." The benefit of using geofoam as opposed to other materials in earthworks is the significantly reduced stresses on the underlying subgrade. This can have multiple benefits in terms of reduced settlements, increased stability, and lightweight fill material under highway. Useful index property in the same way that particle size of granular soils or Atterberg Limits of plastic soils are useful index properties of soils.
4. **Compressible Inclusions**: Geofoam can be formulated to be highly compressible and thus efficient for use behind or above rigid/nonyielding structures. This allows what is called controlled yielding (movement) of the adjacent soil or rock which in turn reduces the load on the structure. The classical soil mechanics phenomenon of arching is one type of yielding that can be induced using a compressible inclusion as is the development of the active earth pressure state behind an otherwise non-yielding wall.
   Applications fall into two broad categories: Earth retaining structures where horizontal arching is involved. Pipes, culverts, and similar structures where vertical arching is involved e.g. Geofoam in landscaping.
5. **Drainage**: Geofoam materials have very low permeability for fluids (both gases and liquids). However, both EPS and XPS geofoam products can be factory cut or purposely shape molded to have geometry such that they readily transmit fluids (especially ground water) along one face or side of the product. This has been extended to EPS-shape products intended to readily transmit ground-borne gases such as methane and radon. There are geofoam materials that have an inherent permeability throughout their entire thickness. The most-common example is glued polystyrene porous block. This panel-shaped product uses expanded spheres of polystyrene that are glued into an open matrix. One face of the panel is typically covered with a geotextile which provides separation and filtration functions. In general, geofoam products are not cost effective compared to other drainage geocomposites when only drainage is required.
6. **Water Absorption:** Any water absorbed into a geofoam product will, as a minimum, increase the coefficient of thermal conductivity of the geofoam and thus reduce its thermal efficiency. This should be considered during the thermal design of geofoam used as thermal insulation. In addition, some geofoam materials (but not EPS or XPS) can have their mechanical (stress-strain) behavior negatively affected by absorbed water. Volume change (increase or decrease) of some geofoam materials (but not EPS or XPS) can also result from water absorption. Geotechnical engineers should be aware of the fact that absorbed water in foam materials is always reported as percent on an absolute volume basis, i.e., volume of water as a percent of the total volume of the geofoam product. This is fundamentally and significantly

different from how water content of earth materials is expressed which is on a relative weight basis (weight of water divided by weight of dry soil or rock). It appears that the reason water content of foams is expressed this way is because water is on the order of 50 times denser than most foam materials so a water content expressed on a weight basis would be a relatively large number (several hundred percent). While there is nothing inherently wrong with this, it does present a nuisance as well as has psychological and marketing impacts.

Scope in India

Due to the development of construction industry in India and a demand for environmental friendly and economical construction material there is a great demand for application of geofoam in various construction activities such as road stabilization ,abutment ,backfilling ,gardening, decorative purpose, road construction over poor soil, road widening, culverts, pipeline and buried structures, compensating foundation, rail embankment, landscaping and vegetative green roofs, retaining and buried wall backfill, slope stabilization, stadium and theater seating, airport ways, taxi ways.

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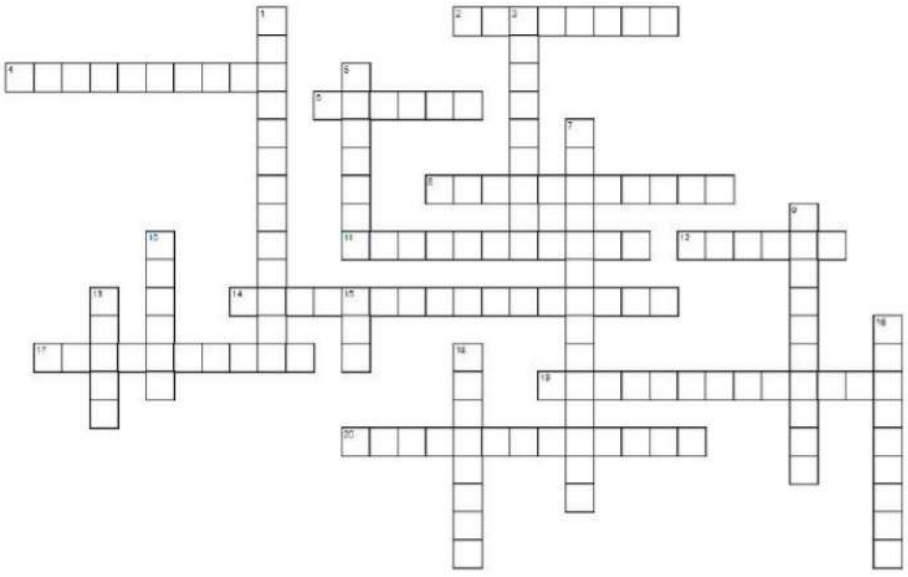
SOLVE THE CROSSWORD



ACROSS

2 Move by Argument
4 Retreating From a Conflict
6 Planned Allocation of Resources
8 Common and Special Cause
11 Surroundings
12 Authorized Deviation from Specifications
14 Allowances for Change
17 Give and Take Agreement
19 Favorable Outcomes
20 Comparison of Income to Money Spent

DOWN

1 Optimization of Cost to Performance
3 Risk Assumptions
5 Pattern of Human Knowledge
7 Written Outline of Activities of a Job
9 Distribution of Authority or Responsibility
10 Source of Risk Danger
13 Activity with Zero Time Duration
15 A Start-Finish Relationship
16 Examine with Intent to Verify
18 Development of Specific Skills

ARE HIGH-RISE URBAN FORESTS POSSIBLE?

The building sector is responsible for nearly 40% of the total carbon emissions generated worldwide, according to global architecture, urban planning, and engineering firm Skidmore, Owings & Merrill. To transform the built environment into a more resilient space while increasing the supply of new building stock for the future, the firm has developed a groundbreaking concept — Urban Sequoia.

Under the novel concept, high-rise towers would be built with materials that would absorb carbon at an unprecedented rate. These buildings would act in a manner similar to trees, purifying the air and regenerating the environment. Building multiple towers using such designs would create "urban forests," the company says.

"We are quickly evolving beyond the idea of being carbon neutral. The time has passed to talk about neutrality," said Chris Cooper, a partner of SOM, in press material about the design concept. "Our proposal for Urban Sequoia — and ultimately entire 'forests' of Sequoias — makes buildings, and therefore our cities, part of the solution by designing them to sequester carbon, effectively changing the course of climate change."

The high-rise design calls for the use of natural photosynthesis, direct air capture, and the integration of living materials within the building to sequester carbon. The captured carbon could then be used in building systems or to produce biomaterials for use elsewhere. Used at a large scale, the processes could create a new carbon economy and a resilient urban environment, according to SOM.

The firm released a concept for its high-rise design at the 2021 UN Climate Change Conference in Glasgow, Scotland — referred to colloquially as COP26 — that could be built immediately. The design called for materials such as biobricks, hempcrete, timber, and biocrete to be used wherever possible. These construction materials would have 50% of the carbon load of traditional carbon and steel, the firm says. Overall, the building could potentially sequester as much as 1,000 tons of carbon per year, the equivalent of 48,500 trees, according to SOM.

The expectation is that after 60 years, the prototype would have absorbed up to 400% more carbon than was emitted during construction. And if biomass and algae are integrated into the facade, the building could become a biofuel source for heating systems, cars, and planes or a bioprotein source for industrial use.

The sustainability strategies could also be used to revolutionize the design and construction of streets, parks, and other green spaces. Carbon-absorbing landscapes and carbon-capture technology could be used to produce biomaterials for roads, pavements, and pipes.

If every city around the world erected high-rise Urban Sequoia forests, the built environment could remove up to 1.6 billion tons of carbon from the atmosphere every year, according to SOM.

-PROF. MAHENDRA DAIMA
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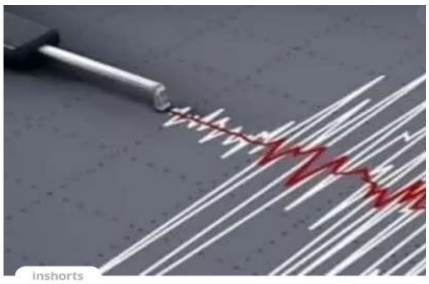
News Bulletin

Deep-sea pipeline in Maharashtra's Palghar to be ready in 2 months

A deep-sea pipeline at Tarapur MIDC, being constructed to carry treated industrial effluents about 7 km away from high-tide line at Navapur beach in Maharashtra's Palghar district, will be operational within next two months, according to officials. The existing concrete pipeline that is operational since 1970s, suffers from frequent leaks, a Tarapur Environment Protection Society official said.

DRDO constructs 7-storey building in record 45 days for developing fighter jets

Defence Research and Development Organisation (DRDO) has constructed a seven-storey FCS Complex in record 45 days in Bengaluru. The building would be used as the R&D facility for the indigenous development of fifth-generation Advanced Medium Combat Aircraft (AMCA). Defence Minister Rajnath Singh inaugurated the FCS Complex in Bengaluru on Thursday.



6.7-magnitude earthquake hits Indonesia's Sumatra; no casualties reported

An earthquake of 6.7 magnitude struck Indonesia's Sumatra island on Monday prompting residents to flee homes. The epicentre was located at about 167 km from the coastal city of Pariaman, as per US Geological Survey. No loss of life or other damages were reported. The authorities initially warned of a potential tsunami but later lifted the warning.

Earthquake of magnitude 4.1 hits Arunachal Pradesh

An earthquake of magnitude 4.1 hit the Pangin town in Arunachal Pradesh's Siang district on Tuesday, the National Center for Seismology (NCS) informed. "Earthquake of Magnitude: 4.1, occurred on 15-03-2022, 08:21:03 IST, Lat: 30.08 & Long: 95.18, Depth: 10 Km, Location: 215km N of Pangin, Arunachal Pradesh," NCS tweeted. Its epicentre was located 215 km north of Pangin.

PMC to construct 100 MT solid waste management plant in Pune

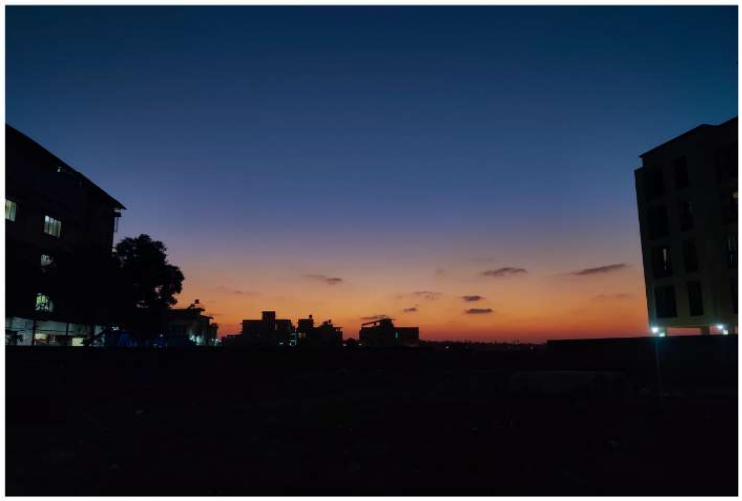
A solid waste management project is to be set up at a ten-acre independent plot of Cantonment Board located in Pune's Hadapsar Industrial Estate. The project has been approved by the Pune Municipal Corporation (PMC) for a cost of ₹20 crore. Out of the total, ₹7.50 crore have been sanctioned for constructing a 100 metric tonne processing plant.

24,302 mangroves to be felled for Virar-Dahanu railway line expansion in Palghar

The Mumbai Railway Vikas Corporation will divert 26.5 hectares of forest land across 11 villages in Palghar to expand the existing railway line between Virar and Dahanu stations. As per official documents, the project will lead to the felling of 25,438 trees, including 24,302 mangroves. Compensatory afforestation has been proposed on 54 hectares of degraded land in three nearby villages.

CANVAS

KALPITA CHAFEKAR
B.E. CIVIL



YASH PATIL
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