



GANDHI INSTITUTE OF ADVANCED COMPUTER AND RESEARCH

RAYAGADA

(Approved by AICTE, Affiliated to SCTE&VT and BPUT - Odisha)

DEPT OF CIVIL ENGINEERING



CONCRETE DIALOGUES

2022-23



Editorial Board

Editor-in-Chief

Guru Prasad Patro
Senior Lecturer
Dept. of Civil Engineering,

Co-Editor

Santosh Kumar Naik
Lecturer in English
Dept. of Civil Engineering,

It gives us immense pleasure to present *Concrete Dialogue*, the annual departmental magazine of the Civil Engineering Department. This publication stands as a reflection of the academic excellence, technical competence, and creative spirit of our students and faculty members. *Concrete Dialogue* is a platform where knowledge meets creativity. Authored and edited by students and teachers, the magazine is published in English and showcases a comprehensive report of departmental activities. The magazine provides an opportunity for budding civil engineers to express their innovative ideas, technical insights, research interests, and creative abilities. It encourages students to develop the habit of reading, writing, critical thinking, and professional communication — essential qualities for a successful engineer.

The Editorial Board comprises the Editor, Co-Editor, and Faculty Coordinators who work collectively to review and select quality contributions. We sincerely appreciate the enthusiastic participation of students and staff who contribute articles, technical papers, project summaries, site experiences, creative writings, and innovative ideas. This magazine not only documents the academic journey of the department but also serves as a source of inspiration for students to learn from the experiences and achievements of their peers. We hope that *Concrete Dialogue* continues to motivate young minds to build not only strong structures but also strong ideas for the betterment of society.

Publisher

Gandhi Institute of Advanced Computer and Research, Rayagada

Message from Chairman



Dr. Chandra Dhawaja Panda

It gives me immense pleasure to release the current issue of the technical magazine *CONCRETE DIALOGUE* for the academic year 2022–2023, with a special emphasis on civil engineering. This edition stands as a productive technical resource and a skill-enhancing platform for aspiring civil engineers.

Civil engineering is not merely about structures and materials—it is a canvas for imagination and innovation. It offers a dynamic space for independent thinkers to transform ideas into tangible realities. True engineering education goes beyond infrastructure; it nurtures creativity, fosters collaboration, and builds the capacity to work across disciplines—be it with architects, urban planners, environmentalists, or entrepreneurs.

This issue of *CONCRETE DIALOGUE* captures the spirit of civil engineering through a rich blend of technical articles, project showcases, and student-led innovations. It also highlights co-curricular and extra-curricular engagements at both national and international levels, including conferences, faculty development programs, and institute-industry interactions. Seminars and workshops on sustainable construction, smart infrastructure, and emerging technologies further enrich the learning experience.

I am confident that this edition will be both informative and inspiring for students, faculty, and professionals alike. I extend my heartfelt appreciation to the coordinators and editorial team for their tireless efforts in bringing this issue to life. May *CONCRETE DIALOGUE* continue to illuminate the path of innovation and excellence in civil engineering.

Warm wishes and continued success to all!

Message from Secretary



Mr. Manoj Kumar Palo

It is with great pride and enthusiasm that I present the latest edition of *Concrete Dialogue*, our annual magazine dedicated to the vibrant world of civil engineering. This publication reflects the collective spirit, innovation, and academic rigor that define our department.

Concrete Dialogue serves not only as a technical repository but also as a platform to showcase the creativity and commitment of our students and faculty. From sustainable construction practices to smart infrastructure solutions, the articles and features in this issue highlight emerging trends and thoughtful explorations in the field.

The magazine also captures the essence of our co-curricular and extra-curricular engagements—conferences, workshops, industry collaborations, and student achievements—that enrich our academic environment and foster holistic development.

I commend the editorial team and contributors for their dedication in curating this insightful volume. May *Concrete Dialogue* continue to inspire, inform, and ignite curiosity among readers.

Warm regards,

Message from the Principal



Dr. Pratap Chandra Mishra

It gives me immense pleasure to release the annual edition of Concrete Dialogue, a magazine that encapsulates the academic vibrancy, technical excellence, and creative spirit of our Civil Engineering Department. Civil engineering plays a pivotal role in shaping the world around us—from resilient infrastructure to sustainable urban development. This magazine reflects the dedication of our students and faculty in exploring innovative solutions and advancing knowledge in this vital field.

Concrete Dialogue is more than a compilation of articles; it is a testament to the collaborative efforts, intellectual curiosity, and achievements that define our academic culture. It highlights not only technical insights but also the diverse engagements of our students in seminars, workshops, competitions, and industry interactions.

I congratulate the editorial team and all contributors for their commitment to producing a publication that informs, inspires, and celebrates the spirit of engineering. May this edition serve as a source of motivation and a reminder of the boundless possibilities that lie ahead.

Best wishes for continued success and excellence.

Message from the Head of the Department



Ms. Jyoti Reddy

It is with great pride that I present this edition of *Concrete Dialogue*, our annual magazine that captures the essence of academic growth, technical innovation, and creative exploration within the Department of Civil Engineering.

This publication reflects the collective efforts of our students and faculty, showcasing insightful articles, project highlights, and glimpses into the vibrant academic life that defines our department. From sustainable construction practices to emerging technologies like BlockIoT, our community continues to push boundaries and embrace forward-thinking solutions.

Concrete Dialogue stands as a testament to our commitment to nurturing talent, fostering interdisciplinary learning, and promoting a culture of inquiry and excellence. I commend the editorial team for their dedication and all contributors for enriching this magazine with their perspectives and achievements.

May this edition inspire continued curiosity, collaboration, and a deeper appreciation for the transformative power of civil engineering.

Vision and Mission of the Institution

Vision

To become a globally recognized, value-driven educational institution committed to excellence in delivering quality education, nurturing students' inherent talents, and developing innovative professionals in technical and managerial fields, thereby equipping them to meet the future challenges of the global economy.

Mission

M₁: To deliver quality education through effective teaching–learning processes that foster academic excellence in technical and managerial disciplines.

M₂: To nurture students' inherent talents by encouraging creativity, critical thinking, innovation, and lifelong learning.

M₃: To develop competent and ethical professionals with strong values, leadership skills, and social responsibility.

M₄: To promote industry-oriented learning and research through collaboration, practical exposure, and adoption of emerging technologies.

M₅: To prepare globally competitive graduates capable of adapting to evolving challenges and contributing effectively to the global economy.

Vision & Mission of Department of Civil Engineering

Vision

To emerge as a center of excellence in civil engineering education, delivering globally relevant knowledge and developing ethically strong engineers dedicated to building the nation.

Mission

M1: To provide strong foundational and advanced knowledge in civil engineering and technology through effective teaching–learning processes.

M2: To inculcate ethical values and professional responsibility among students to develop socially responsible engineers.

M3: To promote practical learning and industry interaction through fieldwork, internships, and real-world projects.

M4: To encourage innovation, research, and sustainable engineering practices addressing global and societal needs.

M5: To prepare competent civil engineers capable of contributing effectively to infrastructure development and national growth.

CONTENT

SL. NO	TITLE	PAGE NUMBER
1	TRANSLUCENT CONCRETE	1
2	THEODOLITE AND DUMPY LEVEL	4
3	ESTIMATION IN CIVIL ENGINEERING	6
4	SLAB CULVERT	8
5	FIBER REINFORCED POLYMER USED IN CONSTRUCTION	9
6	MACROSCALE HYDROLOGICAL MODELLING TO ASSESS THE IMPACTOF LAND COVER CHANGE ON STREAM FLOWS	10
7	WHY CORROSION & ITS CONTROL	12
8	COPPER SLAG AS A HIGH VALUE APPLICATION MATERIAL IN CONCRETE	14
9	IS THE WATER SAFETODRINK?	15
10	CONSTRUCTION & DEMOLITION WASTE MANAGEMENT IN INDIA	16
11	CONSTRUCTION POLLUTION	18
12	NOISELESS BUILDINGS	19
13	MODIFIED ROTATING BIOLOGICAL CONTACTOR SYSTEM	21
14	URBAN ENVIRONMENT QUALITY IN VISAKHAPATNAM	24

RANSLUCENT CONCRETE

By Kapilash Naik 3rd year Civil

Translucent concrete (also: light-transmitting concrete or transparent concrete) is a concrete based building material with light-transmissive properties due to embedded light optical elements— usually optical fibers. Light is conducted through the stone from one end to the other. Therefore, the fibers have to go through the whole object. This results in a certain light pattern on the other surface, depending on the fiber structure. Shadows cast onto one side appear as silhouettes through the material. Translucent concrete is used in fine architecture as a façade material and for cladding of interior walls. Light-transmitting concrete has also been applied to various design products. Several ways of producing translucent concrete exist. All are based on a fine grain concrete (ca. 95%) and only 5% light conducting elements that are added during casting process. After setting, the concrete is cut to plates or stones with standard machinery for cutting stone materials. Due to bends in the fibers and roughness on the cut surfaces of the fibers, light transmission is generally a bit less than half the incident light on the fibers, so given five percent fibers, about two percent. As the human eye's response to light is nonlinear, this can still give useful day lighting. In theory, the fibers could carry light around corners and over a distance of tens of meters, with the rate of loss with increasing length depending on the type of fiber and how it is bent. Working with natural light it has to be ensured that enough light is available. Wall mounting systems need to be equipped with some form of lighting, designed to achieve uniform illumination on the full plate surface. Usually mounting systems similar to natural stone panels are used — e.g., LUCE Muses perforated mounting with visible screws, undercut anchors with agraffes or façade anchors. Translucent concrete Translucent concrete (also: light-transmitting concrete or transparent concrete) is a concrete based building material with light transmissive properties due to embedded light optical elements — usually optical fibers.

Light is conducted through the stone from one end to the other. Therefore, the fibers have to go through the whole object. This results in a certain light pattern on the other surface, depending on the fiber structure. Shadows cast onto one side appear as silhouettes through the material. Translucent concrete is used in fine architecture as a façade material and for cladding of interior walls. Light-transmitting concrete has also been applied to various design products. Several ways of producing translucent concrete exist. All are based on a fine grain concrete (ca.

95%) and only 5% light conducting elements that are added during casting process. After setting, the concrete is cut to plates or stones with standard machinery for cutting stone materials. Due to bends in the fibers and roughness on the cut surfaces of the fibers, light transmission is generally a bit less than half the incident light on the fibers, so given five percent fibers, about two percent. As the human eye's response to light is nonlinear, this can still give useful day lighting. In theory, the fibers could carry light around corners and over a distance of tens of meters, with the rate of loss with increasing length depending on the type of fiber and how it is bent. Working with natural light it has to be ensured that enough light is available. Wall mounting systems need to be equipped with some form of lighting, designed to achieve uniform illumination on the full plate surface. Usually mounting systems similar to natural stone panels are used — e.g., LUCEM uses perforated mounting with visible screws, undercut anchors with agraffes or façade anchors.

Variants: Apart from fine fiber patterns due to the use of optical fibers or textiles some products with much coarser light pattern are available. The main advantage of these products is that on large scale objects the texture is still visible — while the texture of finer translucent concrete becomes indistinct at distance. Further pictograms and lettering can be realized with this technology. An approach that does not use waveguides involves using transparent aggregate and binders. However, chemically this would not necessarily resemble concrete, and might resemble fiberglass. Unlike materials requiring alignment of optical fibers, however, it might be transported and poured using existing infrastructure.





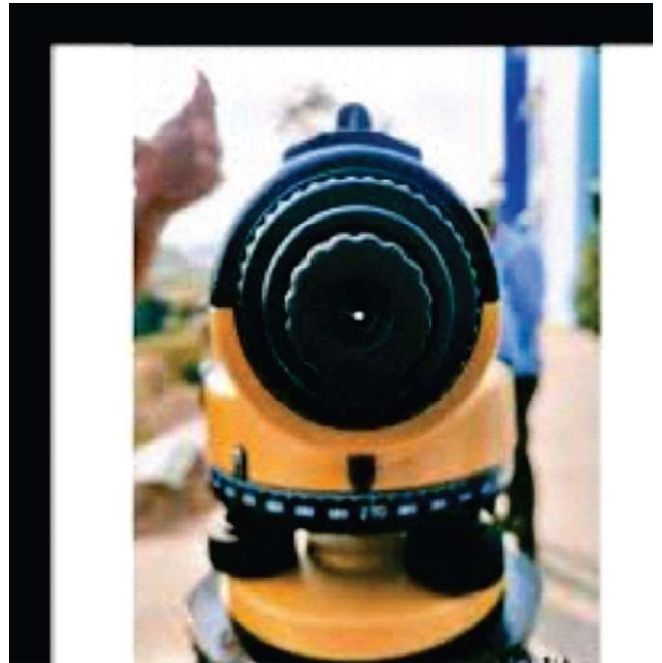
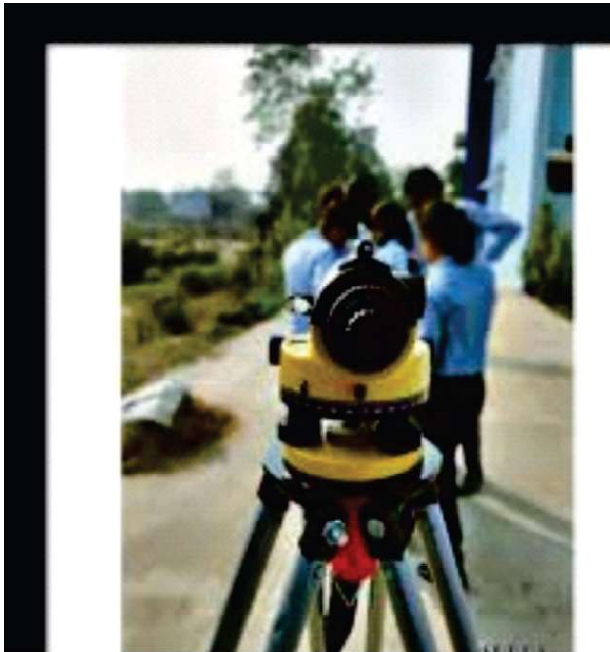
THEODOLITE AND DUMPY LEVEL

By: Babula Nimaka 3rd year Civil

A theodolite is a precision optical instrument for measuring angles between designated visible points in the horizontal and vertical planes. The traditional use has been for land surveying, but it is also used extensively for building and infrastructure construction, and some specialized applications such as meteorology and rocket launching. It consists of a moveable telescope mounted so it can rotate around horizontal and vertical axes and provide angular readouts. These indicate the orientation of the telescope, and are used to relate the first point sighted through the telescope to subsequent sightings of other points from the same theodolite position.

These angles can be measured with accuracies down to micro radians or seconds of arc. From these readings a plan can be drawn, or objects can be positioned in accordance with an existing plan. The modern theodolite has evolved into what is known as a total station where angles and distances are measured electronically, and are read directly to computer memory. In a transit theodolite, the telescope is short enough to rotate about the trunnion axis, turning the telescope through the vertical plane through the zenith; for nontransit instruments vertical rotation is restricted to a limited arc. The optical level is sometimes mistaken for a theodolite, but it does not measure vertical angles, and is used only for levelling on a horizontal plane (though often combined with medium accuracy horizontal range and direction measurements).

Dumpy Level is a surveyor's level with a short telescope rigidly fixed and rotating only in a horizontal plane. It is widely used in surveying and construction to measure height differences and to transfer, measure, and set heights of known objects or marks. It is also known as a Surveyor's level, Builder's level, Dumpy level or the historic "Y" level. The primary advantage of using the Dumpy level over other levelling instruments is its greater accuracy. For most tachometric methods, a dumpy level is known for high precision values. A dumpy level's accuracy can be as high as 1:4000 for every 100 meters. In a dumpy level, there are only two adjustments as the telescope is rigidly fixed to the spindle. 1. The axis of the bubble tube should be perpendicular to the vertical axis. 2. The line of collimation should be parallel to the axis of the bubble tube. The dumpy level instrument is set up on the top of the tripod. Foot screw is used to screw the device tightly on the tripod. As the level head is very sensitive, special care is required in this step. To work properly, it is very important to make the dumpy level completely horizontal.



ESTIMATION IN CIVIL ENGINEERING

Gayatri Majhi, 1st year Civil

Estimation in civil engineering is the process of determining the number of materials, resources, and especially project costs needed to operate during a construction project. This is usually done before the start of the project, so you can procure estimated materials and gather the funds as the project progresses. It's pretty close to the actual cost of your project requirement. Depending on the accuracy of the estimation method used and the correct list of operations performed, the estimates will approach the actual values. The estimated value should not be far from the actual project cost. This is because it can lead to a disadvantage for the client or expert. If the project is undervalued, the client will always be shocked if the budget exceeds the estimate, and if it is overvalued, the estimator will be repelled when the company loses bids and even jobs. You may face it. Cost estimation in civil engineering is one of the most important aspects of construction management, so great care should be taken when calculating costs. Future quote engineers need to show their skills. It may seem like a trivial task, but it requires careful analysis, proper procedures, and the most appropriate method. Importance of Estimation in Civil Engineering Without estimation in civil engineering, it is impossible to complete a construction project at actual operating costs. The client or project manager cannot keep the project cost within reasonable limits unless the project cost has already been estimated.

Each owner can decide whether or not to proceed with the proposed project based on the estimated cost of the project. Depending on the funds available and the value of the product, the client can proceed with the project or carefully consider the details of the quote and then abandon the project.

Most construction project bids are open to the public by government agencies, so you need to make reasonable estimates to secure your bids. If the cost of the project exceeds the bid (or contract amount), not only will the contract be paid at your own expense, but legal action may be taken if you abandon the project. For this reason, the quote should be performed by a knowledgeable and experienced estimator, along with the required resource methods.

Importance of Estimation in Civil Engineering



To Estimate
Materials



To Estimate
Labour



To Estimate
Equipment



To Estimate
Time

SLAB CULVERT

Mandingi Bijaya, 1st year Civil

Culvert is a structure constructed over running water or physical obstruction. The main purpose of constructing culvert structure is to provide passage over the obstruction. Slab culvert, a type of culvert, could be three-sided or simply a deck slab. It is embedded in the soil on both sides. The slab provides a bridge over the distance. Slab culverts can replace box culverts if no artificial flooring is necessary. Slab culverts do not have bottom slabs, therefore, the natural flow of water is maintained and natural bottom substrate remains intact. The safety of high velocity vehicles is not affected by slab culvert as it doesn't have any sharp corner.



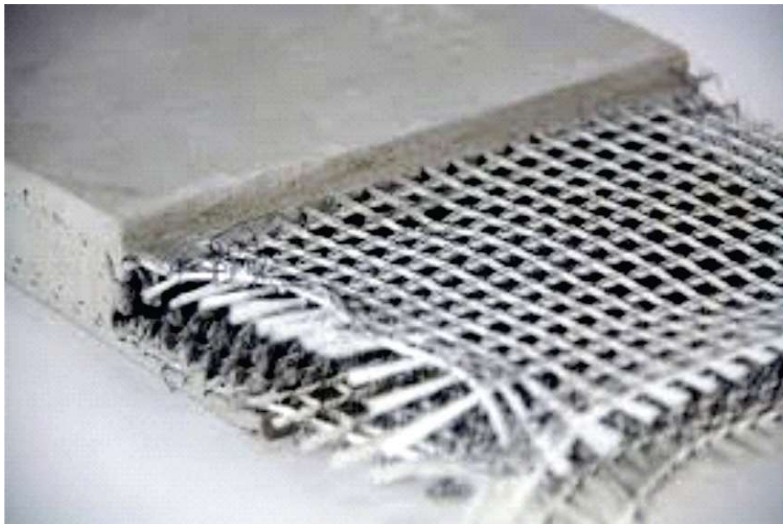
While constructing the slab culvert, a series of slabs are laid to form the bridge-like structure. After that, a pavement surface is placed on top to serve the purpose as the road. The standard span length ranges from 8' to 48'. ASTM C 1504 design code is followed to design the slab culvert.

FIBER REINFORCED POLYMER USED IN CONSTRUCTION

Rashmita Garadia, 1st Year Civil

Fiber reinforced polymer is composed of a protective polymer reinforced with high-strength fiberglass. Together, these materials create a premium composite with many potential construction applications. Fiber reinforced polymer outperforms wood and concrete for bridges, pedestrian pathways and other structures, while holding up to decades of wear and tear.

Fiber reinforced polymer can be used for repair and strengthening of existing structures. Externally bonded reinforcements can be used to reinforce concrete, timber, steel and masonry structures. At just 10–20% the weight of reinforced concrete decking, FRP panels are lightweight yet strong enough to withstand high foot traffic, motor traffic and high static loads. Ease of installation. The lightweight nature of FRP also facilitates construction. It is used in high-performance hybrid structures. Fiber reinforced polymer bars are used as internal reinforcement for concrete structures. FRP bars, sheets, and strips are used for strengthening of various structures constructed from concrete, masonry, timber, and even steel. Fiber reinforced polymer (FRP) systems used to reinforce and strengthen concrete, masonry, steel and timber structures including aramid (AFRP), basalt (BFRP), carbon (CFRP), and glass (GFRP) fibers.





MACROSCALE HYDROLOGICAL MODELLING TO ASSESS THE IMPACT OF LAND COVER CHANGE ON STREAM FLOWS

By Jyotirmaya Naik, 2nd year Civil

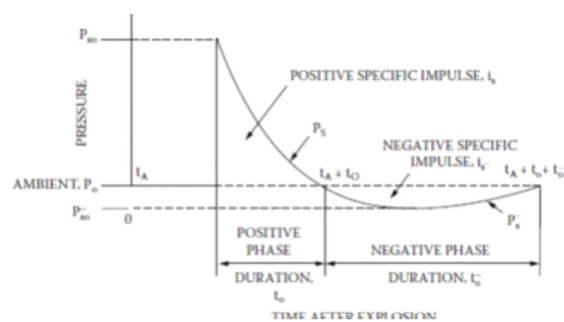
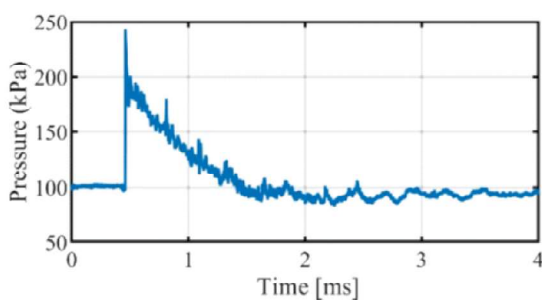
Western Ghats of India is identified as one of the biological hotspots with diversified flora and fauna. However, for the river basins in this region starting from Tadri to Kanyakumari is undergoing continuous land-use land-cover (LU/LC) changes in the past few decades. These changes in LULC has caused major hydrological impacts in this region. In this study, the hydrological impacts of LU/LC changes in the river basins of Tadri to Kanayakumari in Western Ghats is assessed using the VIC model. Initially the LU/LC changes for the past four decades are analysed using the Landsat images for the years 1985, 1995, 2005 and 2016. It is observed that, there are reduction in forest areas (7%), increase in croplands (4%) and increase in urban areas (4%). Using 30 years (1979-2015) of climate data and changing LU/LC, the hydrological impacts were assessed using the VIC model. It is observed that impact due to change in land use pattern in mean basin runoff is noticeable (± 5 mm/year). Further station wise analysis showed that, there is noticeable variation in the streamflow i.e., 11 mm/year (increase) at Bantwal (Nethravati river) due to conversion of forest land into built up and at the same time 12 mm/year (decrease) at Karathodu (Kadalundi river). From Fig. 1, we can see the impact of LU/LC on runoff is noticeable. When we analyse the LU/LC classes over that area we can see earlier it was of waste land and then by 2016, it gets converted to urban

built up which reduce the infiltration capacity and finally an increase of runoff. Similarly, most of the forest regions in the basin gets depleted which increased the runoff in those grids of upper and middle part of the basins (Reference : Aswathi Sebha John, Navya Chandu, T I Eldho (2019) “Macroscale hydrological modelling to assess the impact of land cover change on streamflow” Proc. HYDRO International Conference Hydraulics, Water resources Coastal Engineering, 18-20 Dec 2019, Osmania University, Hyderabad, India.)

blast-resistant structures to save lives and protect infrastructure against such threats. This research work focuses on developing analysis methods and design techniques to mitigate the structural damage and reduce the loss of lives from blast-induced structural failures of critical civil infrastructure vulnerable to explosions. The blast load due to far field detonations is estimated accounting for near field detonations in confined urban environment characterized by fluid structure interaction (FSI). Experiments are conducted to estimate the capacity of reinforced concrete columns against varying amounts of explosives. A performance-based analysis and design approach is developed for blast-resistant design of RC column. The design approach is validated using experiments and verified using high-fidelity numerical simulations.

Estimation of blast load

The detonation of high-explosives generates blast waves that travel through the surrounding media and applies pressure on a structure or object in its path. The pressure history observed from experiments and its idealized representation are shown in Figure 2 and Figure 3, respectively.



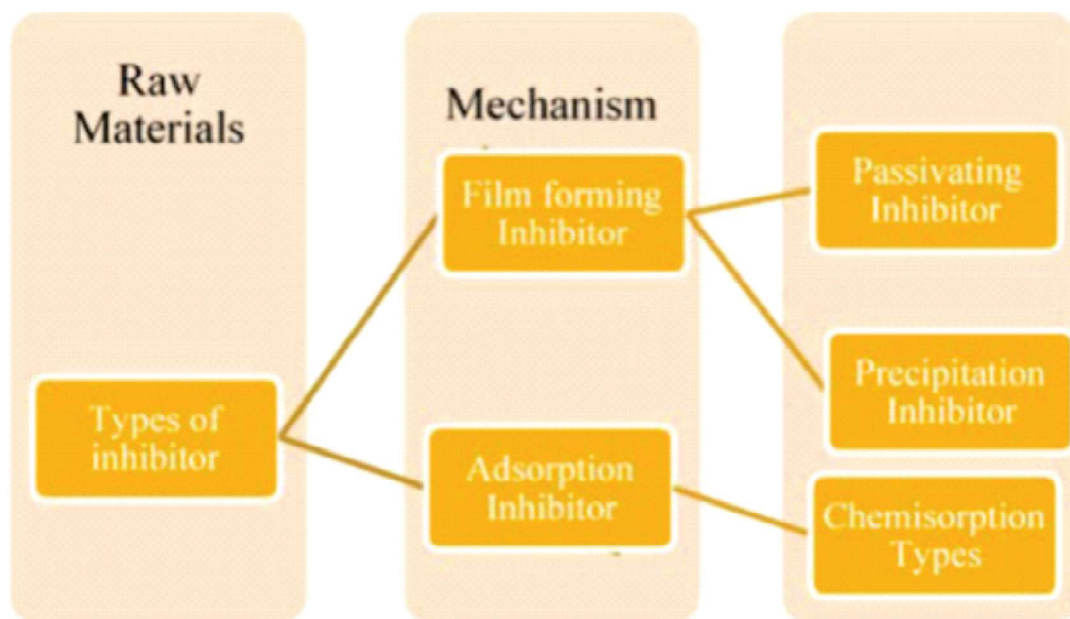
The parameters of the idealized pressure history in Figure 3 can be obtained using experimental data available in the literature as the Kingery-Bulmash chart (Kingery and Bulmash, 1984). However, these charts are not valid for near-field explosions characterized by several complex phenomena that occur during an explosion, including the Fluid Structure Interaction (FSI). The interaction of blast wave with a column using computational fluid

dynamics (CFD) and the schematic of a newly developed FSI model are shown in the above figure.

WHY CORROSION & ITS CONTROL

Happy Mandinga, 2nd Year Civil

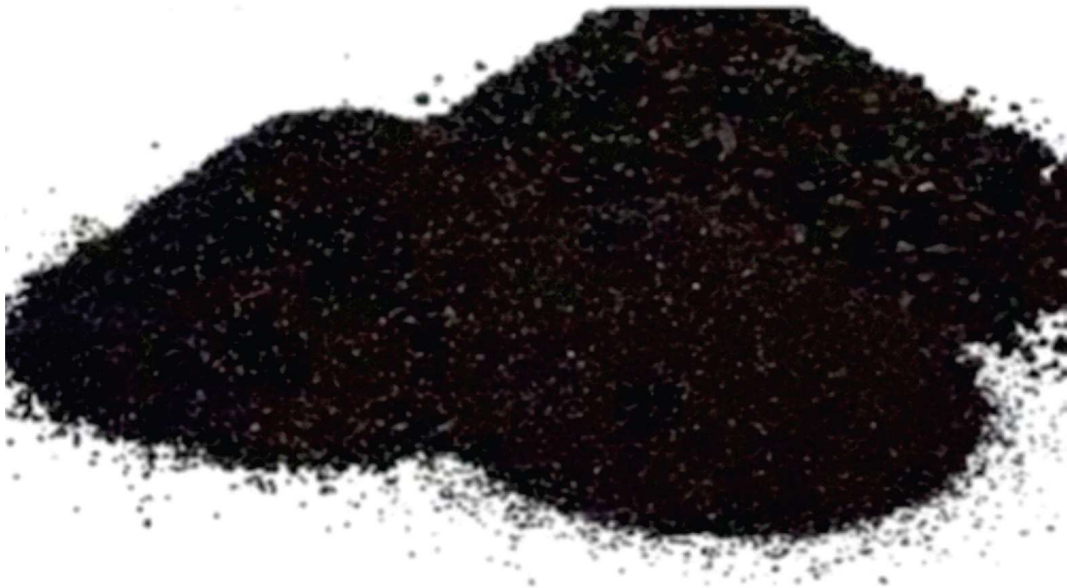
Corrosion is a big menace to the economy of the country. The loss due to corrosion has been estimated to be of the order of 2 - 5% of the GNP of any country. In India the losses have been estimated approximately at 25,000 crores rupees per year due to the impact of corrosion according to Newsletter NACE, India. Deterioration of a material, usually a metal, that results from a chemical reaction with its environment. - ACI Concrete Terminology Corrosion occurs when the protective layer (passivation layer) in concrete steel reinforcement is destroyed. Steel in concrete is usually protected against corrosion by the high pH of the surrounding Portland-cement paste. Cement paste has a minimum pH of 12.5, and steel will not corrode at that pH level. If the pH is lowered (for example, to pH 10 or less), corrosion may occur if moisture, oxygen, and chloride ions are present. Chloride ions destroy the protective layer on the steel reinforcement, making it prone to corrosion. The corrosion product (rust) occupies a greater volume than the steel and exerts destructive stresses on the surrounding concrete. To avoid corrosion damages and durability of reinforced concrete, it's important to protect structure against corrosion. There are various methods available to prolong service life of structure against corrosion.



COPPER SLAG AS A HIGH VALUE APPLICATION MATERIAL IN CONCRETE

Sujita Bidika, 2nd yar Civil

Concrete is the most common material used in construction industry which offers dimensional stability to the structure with low cost and high durability. Out of the main ingredients of concrete, sand and aggregate together make up around 60-70% part of concrete while remaining part includes cement, mineral admixture, chemical admixture, water etc. Taking in to consideration the high cost of cement than other ingredients, use of industrial by products as a cementitious material or binder in concrete can be considered as a high value application material in concrete which can help to reduce the cost of construction and to solve the environmental issues. One of such material is copper slag.



Our research includes both application part as well as fundamental study. Currently we are working on pozzolanic reactivity part. Results showed that it has a potential to use it as a binder in concrete which is beneficial to construction industry as it is difficult to find quality material at particular site. Flow chart of the research work is shown below. Also, we are trying to develop a Guarded hot plate apparatus (ASTM C 177) in our lab which can measure the thermal conductivity of blocks, bricks etc. which is a part of our study.

IS THE WATER SAFE TO DRINK?

By Santosh Malik, 2nd year Civil

The average person doesn't think twice before drinking from a water fountain. The public assumes the water is safe, that the building manager monitors the water quality. In reality, there are no standardized practices that govern plumbing safety. And water quality is easily compromised when buildings are underutilized and water in pipes remains stagnant for long periods of time. It's a problem exacerbated by the COVID-19 pandemic which led to salons, gyms, offices, municipal buildings, schools and sports venues standing empty for months. Andrew Whelton, associate professor of civil engineering and environmental and ecological engineering faculty scholar, has researched the preservation and disinfection of water supplies for decades. Now, he and his team have fielded calls from around the world asking for advice on how to

test water quality, flush and disinfect systems and ensure that building water is safe for occupants as facilities begin to reopen. "It's not unusual that building managers don't know how to determine if plumbing is safe," Whelton said. "People have never really thought about it. Public health officials who oversee building occupancy and safety don't have extensive training in plumbing safety. And there are no federal, state, or county regulations to guide them on how to clean that water." Whelton is developing a course in collaboration with Purdue Online to train public health officials about building water safety. He's also conducting research on buildings that have been sitting idle during the pandemic. This research will contribute significant gains in the area of plumbing safety which currently lacks evidence-based guidance on how to reinstate plumbing systems that sit idle for extended periods of time. "Many building owners have never thought about plumbing safety because buildings are meant to be used," Whelton said. "When a building is in normal use, there is disinfectant and hot water running through the plumbing systems. When you have water sitting in plumbing for lengthy periods of time, all the chemical disinfectant is gone." The longer water sits, the more lead and copper leaches into it. Consuming high concentrations of copper can lead to stomach cramps and nausea. Bacteria is also a concern, particularly *Legionella pneumophila*

which causes Legionnaires' disease. The disease is contracted by breathing in droplets of water contaminated by the bacteria. But, Whelton cautions, just because major outbreaks associated with waterborne illness aren't reported, doesn't mean they don't happen. The Centers for Disease Control issued water safety guidelines for schools as they reopen, encouraging staff and students to bring their own water to minimize use of water fountains. Although the guidelines were specific to schools, the same cautionary principles apply to any facility with significant periods of underuse. "Circumstances surrounding the pandemic have led to a realization that what people thought they knew about water safety isn't necessarily true," Whelton said. "The assumption that water is safe at every tap is not based on science or evidence. We want to establish protocols for plumbing safety so when a building manager is asked, not only, 'Is the water safe to drink?' but 'What did you test it for? How did you test it?' They will be able to provide evidence-supported results based on established scientific testing procedures."

CONSTRUCTION & DEMOLITION WASTE MANAGEMENT IN INDIA

By Pratika Kumari Yadav, 3rd year Civil

The construction industry has gained very fast growth in recent decades due to the increase in the population, increase in the IT sector and increase in industrialization and also the introduction of new infrastructure projects resulted in the increase of the construction industry drastically. Due to this, the demand for construction materials is huge for the construction activities which results in the generation of a huge amount of construction waste. Construction material wastage resulted in huge financial setbacks to builders, contractors, regional authorities and also to the country. The production of waste due to the demolition of structures is more than the wastage which occurs during the construction of structures, so there is a need for the management of Construction and Demolition (C&D) wastes, as distinct from Municipal Solid wastes, is a relatively new subject in India. To begin with the issue there is no proper estimate regarding the quantity of waste that occurs in India. The primary reason is being disciplinary and less focused on this issue. In this problem, there is the absence of a regulatory framework and strict enforcement. Specific recommendations have been made in this paper to overcome the loopholes in the issue. In this paper, the current global status of construction and demolition waste management is overviewed and also the sustainable waste management hierarchy is studied so to overcome the waste problem.



Due to the increase in the economic growth after development and redevelopment projects in the country and subsequent increase in the urbanization in the cities has made construction sector to increase drastically, but also environmental impacts from construction and demolition (C & D) waste are increasingly becoming a major issue in urban solid waste management.

Environmental issues such as increase in the flood levels due to the illegal dumping of construction and demolition waste into the rivers, resource depletion, shortage of landfill and illegal dumping on hill slopes are evident in the metro cities. For the purpose of management of C&D Wastes in India, Construction and demolition waste has been defined as 'waste which arises from construction, renovation and demolition activities. Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities. The concept of 3R which refers to reduce, reuse and recycle particularly in the context of production and consumption is well known today.

CONSTRUCTION POLLUTION

By Alok Tandi, 2nd Year Civil

According to a study done by the UK Green Building Council, the construction sector uses more than 400 tonnes of material per year. Construction contributes around 23 % to air pollution, 40 % to drinking water pollution, 50 % to climatic changes, and also 50 % to landfills to the environment. Water contaminated by pollutants produced by the construction industry poses a danger to the environment. Noise pollution is likely to be the type of pollution that's effects are experienced immediately. The equipment used is particularly loud, meaning it is often heard by members of the public who live nearby. As a result, this can cause residents to experience varying levels of stress, sleep disturbance, or high blood pressure. WRI attributes up to 71% of Mumbai air pollution was due to construction dust. The development of resorts on the sugarloaf hill caused heavy dust to fly all over the Rushikonda region in Visakhapatnam. In Delhi, 4000 tonnes of construction waste is generated every day which is about 40% of the total waste in the city. Construction works include land clearing, demolition, operation of diesel engines, and burning which releases carbon monoxide, hydrocarbons, PM10, and PM2.5. Experts and doctors said a person who is constantly exposed to dust particles ends up inhaling both visible as well as suspended particulate matter. About 22,000 to 52,000 persons per year are dying due to inhaling polluted air in the USA alone most of whom are construction workers. Delhi banned the construction works to mitigate air pollution. This leads to construction workers suffering due to lack of work. The construction industry has the second major workforce in the world, banning this leads to economic & habitat loss to the government and humans. We all need to have an awareness of the emissions our work activities create and take precautions to limit the harmful impact. Construction and a healthy atmosphere are equally important to humans.

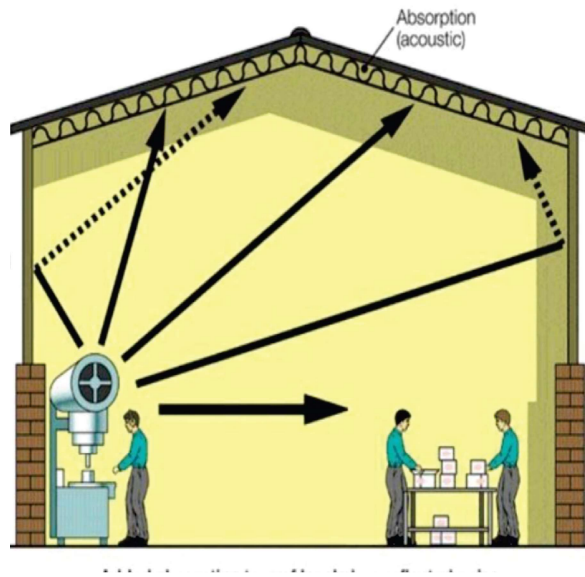
Be a part of solution not a part of pollution



NOISELESS BUILDINGS

By Jitu Swain, 2nd year Civil

It's a noisy world. Twenty-four hours a day, seven days a week, we are exposed to sounds we do not want, need, or benefit from. Noise from many outdoor sources assails our hearing as it invades our homes and workplaces: traffic, aircraft, barking dogs, neighbour's voices. Noise within the workplace from office machines, telephones, ventilating systems, unwanted conversation in the next cubicle distracts us from our work and makes us less productive. Noise from within the home from appliances, upstairs footsteps, TV sound travelling from room to room keeps our homes from being the restful refuges they ought to be. Noise in the classroom impedes the learning process and threatens students' educational experience. Construction activities produce huge noises, which causes discomfort to the people nearby. There are many structures like schools, corporate offices, and residential buildings that are constructed nearby highways face a huge problem of noise pollution due to heavy traffic. Exposure to loud noise can also cause high blood pressure, heart disease, sleep disturbances, and stress.



Noise pollution is a relative thing in a city; it's a jet plane taking off in a monastery it's a pent that scratches.

STC is a sound transmission class rating that is put forward by the AMERICAN SOCIETY OF TESTING AND MEASUREMENT. The sound transmission class is the numerical value equal to the number of decibels in terms of reduction of sound when it passes through a material, which is intended to have some insulating property. This acts as a parameter to guide an architect to know which material would suit the most to have an essential acoustic feature by the reduction of noise. This acts as a parameter to guide an architect to know which material would suit the most, to have an essential acoustic feature by the reduction of noise.

MODIFIED ROTATING BIOLOGICAL CONTACTOR SYSTEM

By Subash Attaka, 1st year, Civil

In developing countries, the problem of sanitation increases due to the increase in population density accompanied by an increase in water consumption. The disposal of domestic wastewater without any treatment into the drainage systems is considered a source of pollution threatening the population. Industrial waste water discharge to the environment is one of the environmental problems which must be controlled. Wastewater from various industries is high in biodegradable organic materials (BOD) and is considered one of the most

pollutant wastewater which required to be treated before being discharged into the environment. Current mainstream technologies for the treatment of domestic wastewater, such as activated sludge and tertiary nutrient removal are too costly to provide a satisfactory solution. Rotating Biological Contactor (RBC) system represents an excellent option for sewage treatment. The rotating biological contactor (RBC) represents a viable means for the secondary treatment of both municipal and industrial wastewaters. Although RBCs entail high initial capital costs, their low costs of operation and maintenance as well as their simple process control, increase their economic viability. In its simplest form, an RBC consists of a series of discs mounted on a horizontal shaft that is slowly rotated. The discs are typically made of a polymer material such as PVC, polystyrene, or polyethylene, and partly immersed in a wastewater stream. About 40% of the disc surface is immersed in the waste water and micro-organisms grow on the discs to form a biofilm. The biofilm is submerged in the waste water flow and exposed to air alternately due to the rotation of the discs. During the periodic submersion the biofilm is brought into contact with the organic pollutants solubilized in the wastewater flow. While exposed to air, a film of waste water is carried along the biofilm, which absorbs oxygen from the air, thereby aerating the waste water. Hence, in this process, the microorganisms are provided with a steady supply of both organic material and dissolved oxygen. Shear forces are exerted on the biofilm due to the rotation of the discs through the wastewater. The rotation of the discs also humidifies the biofilm surface uniformly, and provides turbulence in the liquid phase. Moreover, the presence of a bulk liquid phase allows

for accurate control of the main operating parameters such as pH, temperature and nutrient supply. The modified rotating biological contactor (RBC) system is capable of exploiting the

main advantages of the waste water RBC, which is widely used and generally considered a very robust process. These advantages are the imminent control of the biofilm growth through shear forces acting on the film due to the rotation of the discs, which allow stable long-term performance, as well as low maintenance requirements and an accurate control of the main process parameter, such as pH, temperature, and dissolved oxygen (DO) supply and concentration of nutrients. RBCs are often designed as a series of stages. The series arrangement results in a high degree of organic removal and denitrification, since microorganisms that grow in a particular stage are adapted to the waste water of that particular stage. The residence time distribution approaches plug-flow in a multistage RBC, hence increasing the BOD removal. Therefore, the development of highly efficient and a properly designed modified RBC system with different arrangements of shafts and different rotating media can prove to be most efficient in BOD and COD removal.

ADVANTAGES

- 1) Short contact periods are required because of the large active surface.
- 2) Designed and constructed modified RBCs are capable of handling a wide range of flows.
- 3) Sloughed biomass generally has good settling characteristics and can easily be separated from the waste stream.
- 4) Operating costs are low because little skill is required in plant operation.
- 5) Short retention time.
- 6) Elimination of the channelling to which conventional percolators are susceptible.
- 7) Lower sensitivity and better recovery from shock loadings.
- 8) Low energy requirements and more economy in operation and maintenance.
- 9) Low sludge production and superior process control.
- 10) Simple in operation and maintenance.

DISADVANTAGES

- 1) A lack of oxygen in the first stages limits the range of organic loading rates and influences the formation of anaerobic layers in the biofilm.

2) An excess organic loading rate to the first stage causes intensive biomass growth, which can create some operating problems (with shafts and media).

3) Shaft bearing and mechanical drive units require frequent maintenance. 2 and 3 of the step-feed RBC were higher than those of the control RBC even though the OLR to the stages of the step-feed RBC were higher and DO concentrations were lower. The presence of high influent $\text{NH}_3\text{-N}$ concentrations in stages 2 and 3 of the step-feed RBC be the reason for the higher removal percentages. Overall, the literature review illustrates that:

1) The RBC system was operated at different organic loading rates and hydraulic retention times. The overall removal efficiency for COD significantly decreases with a decrease in total HRT from 10 to 24 hrs and an increase in OLR from 11 to $47 \text{ g/m}^2/\text{d}$. However, the effluent quality of soluble COD remains unaffected. Most of the COD was removed during 1st stage and nitrification took place in 2nd stage.

2) Rotating biological contactors (RBC) constitute a very unique and superior alternative for biodegradable matter and nitrogen removal on account of their feasibility, simplicity of design and operation, short start-up, less area requirement, and low energy consumption, low operating and maintenance cost and treatment efficiency.

3) The modified RBC system was mass transfer limited for loadings below $150 \text{ g/m}^3\text{h}$, whereas at higher inlet concentrations of pollutant, it becomes limited by biodegradation reaction inside the biofilm

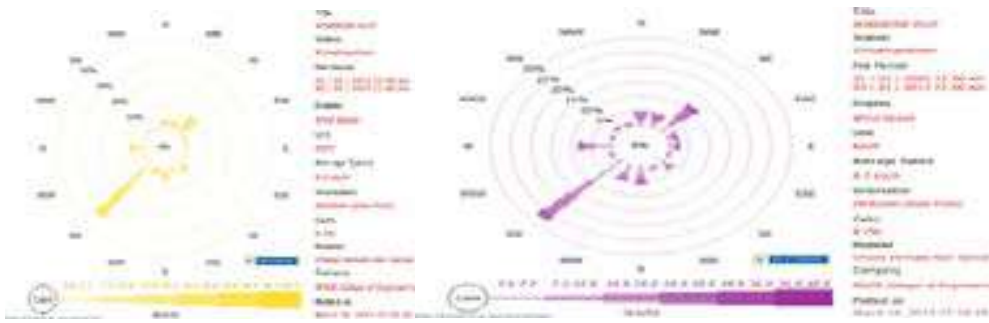
URBAN ENVIRONMENT QUALITY IN VISAKHAPATNAM

By Siba Majhi, 1st year Civil

Increasing sprawl of urban areas due to development activities adversely affects the environment as the human footprint spreads over a larger area resulting in increased movement from one point to another. Urban growth both spatially and population-wise puts heavy pressure on infrastructure, particularly water supply, sewerage, solid waste, sanitation, road network, traffic, transportation, etc., unless infrastructure is improved, quality of life suffers. Most importantly, it impacts the economic development of the city and the investment climate. A big segment of the environment, quality of air has been deteriorating due to enhancement of emission from the transport sector, particularly in large metro cities, which has been a big challenge for scientists, politicians, planner and even for common men. The lack of proper planning may lead to unsustainable development which is extremely undesirable for the budding generations. The air pollution caused by the uncontrolled and above there holds industrial emissions, municipal waste incineration, vehicular traffic, etc. causes drastic degradation of quality and instability of environmental parameters. These parameters have to be stabilized and improved by proper protection measures. Major environmental variables characteristic of the city which are responsible for the degradation of the quality of the environment in the city area are considered for describing the environmental scenario of Visakhapatnam. The point and non-point sources of pollution of air, noise, water, land, soil, regimes as well as coastal and marine sectors have been taken into consideration. The environmental quality varies from region to region within the city area depending upon the assimilative capacity of a region, population density and the number of pollutants causing social damage, the level of valuation and appreciation of the surrounding environment by people in a region, etc. All these factors together accord different values regarding the environmental quality of different regions within the city. The City of Visakhapatnam is one of the largest Municipal Corporations in India and delivers services to about 1.5 million residents spread across a huge geographical area of 515 Sq.km. There has been a significant migration into the city owing to continuing rapid industrialization and urbanization.



The study area is low-lying and surrounded by hills and is subjected to wet weather. The area experiences a lot of rainfall every year. The pre-monsoon months, March-April, have winds from North East. During monsoons, the predominant wind corridors are North East, North, and also south. The post-monsoon period, from October-November, is a period mixed with calm conditions and winds mainly from the North. The winter months, November to February, experience frequent calm conditions. The maximum number of calm periods observed is in the month of December and January. The annual average temperature observed for maximum mean daily is 29.5°C and that of minimum mean daily temperature is 19.7°C . August is the hottest and January is the coldest month of the year. The annual average means the relative humidity is 82% in the morning and 70% in the evening. The climatic condition in the area is thus humid and tropical. The average rainfall from May to September is about 81% of the total contribution. The highest rainfall occurs in the month of July followed by June. The average annual rainfall in the city of Visakhapatnam is 166cm. During the study period, the inversion levels (up to 150 to 200m) were observed to be very low, and the prevailing wind direction is observed to be from North-East and East. Based on the data collected the wind rose diagrams are presented for all the seasons of the year 2005 and for the month of February 2006 as in Fig. 1 and Fig. 2. The wind speed recorded mostly remained within 3kmph. Fig. 1: Wind rose diagram for plot period 2005 to 2013 Fig. 2: Wind rose diagram for 2012-2013



AIR ENVIRONMENT

Air pollution can cause significant effects on the environment, and subsequently on humans, animals, vegetation, and materials. It primarily affects the respiratory (e.g. by fine dust), circulatory (e.g. by carbon monoxide), and olfactory (e.g. by odours) systems in humans. In most cases, air pollution aggravates pre-existing diseases or degrades health status, making people more susceptible to other infections or the development of chronic respiratory and cardiovascular diseases.

Environmental impacts from air pollution can include acidic deposition and reduction in visibility. Following the reconnaissance survey of the study area and taking into account the predominant environmental factors such as winds, topography, and details of existing industrial activities in the region, Ambient air quality was monitored at six stations. The selection of the Air quality monitoring station was done as per MoEF guidelines for conducting an EIA study. One station was set up at the project site (core Zone) and two are in the upwind direction and three are in the downwind direction of the project site. All the stations were not obstructed by hills or any such structures.

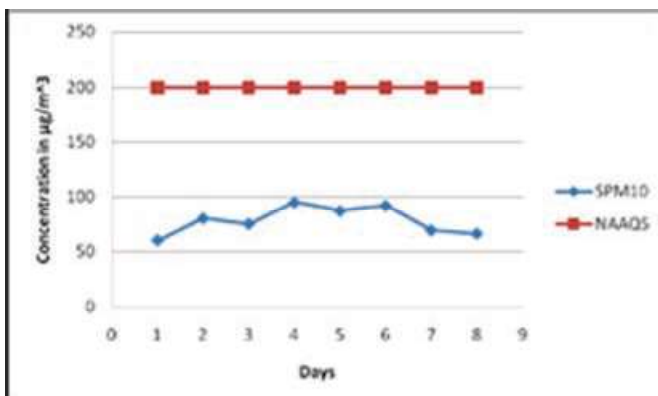
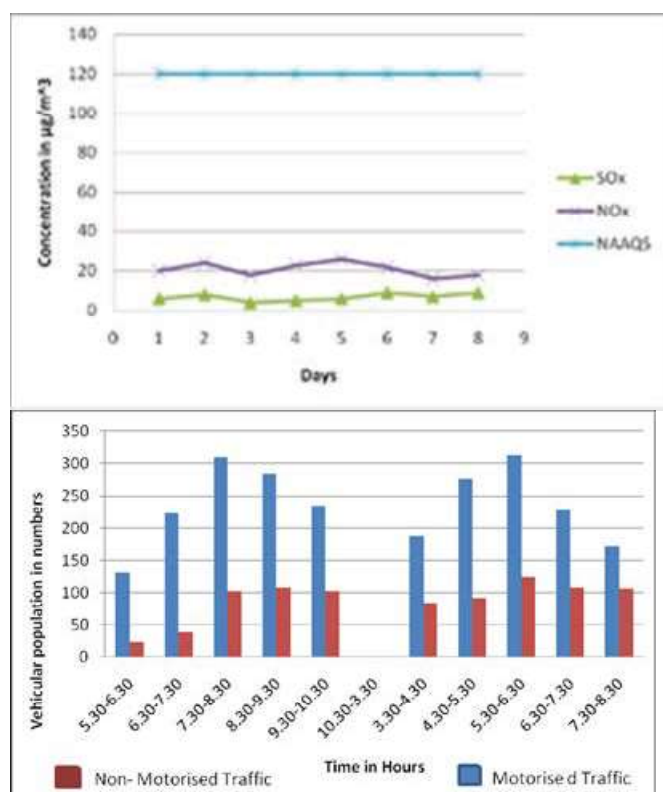


Fig. 3: SPM variation High volume samplers were used to collect/measure the air pollutant concentration data at 24 hours averaging periods for a period starting from February to March 2007 at all the stations. The frequency of sampling was two consecutive days a week for a month.

TRAFFIC AND TRANSPORT.

The baseline traffic count studies are required for assessing the future traffic flow due to proposed activity i.e. landfill and compost facility. The traffic survey is therefore carried out at the NH-5 and the access road junction. However, traffic counting was done for all vehicles passing both ways on NH-5 and passing towards either side of NH-5



It was carried out during the morning and evening including peak hours of the working day and the non-working (weekend) day, at 0900 to 1300 hrs and 1600 to 1900 hrs. The traffic counting includes 3 major compositions, viz. 2-wheelers, scooters, mopeds, and motorcycles; light vehicles comprising petrol and diesel-driven cars, taxis, vans, and auto; and heavy vehicles comprising mainly diesel-driven buses and trucks. The major composition of light vehicles and 2-wheelers are observed during the daytime and heavy vehicles i.e. trucks are observed during nighttime.

The traffic volume is mainly composed of commercial and private vehicles and is seen throughout the day. The curbside air quality is deteriorated due to the dust pollution, resuspended and generated when big vehicles such as buses and trucks carrying stones from the quarries use the access road and the NH-5. The following Table describes the baseline status of the project area.