HIMALAYA COLLEGE OF ENGINEERING

HIMALAYA CIVIL CLUB

PRESENTS

CIVIL MAGAZINE

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MESSAGE FROM THE DIRECTOR

It gives me colossal pleasure to address Himalaya Civil Club for its surmountable effort to produce the first issue of Civil Magazine. I have witnessed your dedication and determination throughout the different phases of publication from the period of commencement to completion. I am very proud and amazed of this team's creative and managerial skills and am pretty confident that this creative venture will get continuity in days ahead too.

- Kishor Gautam

MESSAGE FROM THE PRINCIPAL

"College is a place where students are encouraged to say "I see it, I get it, and I can do it."
I am very happy that students of Civil Engineering Department of Himalaya College of Engineering are going to publish a magazine which include the civil Engineering related news, current technologies developed in the field of Civil engineering and related research article published in renounce journals. This will definitely help concern students to enlarge their knowledge and encourage them to do something new when they are doing their project works and get chance to expose their ability.

We all are concerned with students as they have lives beyond the classroom, and we cannot meet their needs if we show no interest for their extra-curricular activities along with their regular classroom activities. To support their upcoming professional life we are providing regular training to the students in various topics which are not included in their regular courses but they need those knowledes to strengthen their professional life in future. These extra-curricular programs are taught under the careful guidance of renowned coaches and teachers.

- Prof. Dr. Chinta Mani Pokhrel

MESSAGE FROM DEPARTMENT HEAD OF CIVIL ENGINEERING

As with the most accomplishments, it is no-brainer, there are many individuals involved in the creation of the magazine you are holding. On behalf of Department of Civil Engineering, I would like to take this very moment to congratulate each and every hands—directly and indirectly—involved in this undertaking: a timely, insightful, readable and magnificent magazine. No question, such genuine efforts of our students will help to create a conducive and research oriented environment in the college: a tradition worthy to be followed by juniors. Going through, I found it offering lot of information and no doubt will leave you intrigued. I strongly believe beside what the textbooks have to offer, this nature of magazine helps to keep the future and practicing engineer in touch with up-to-the-minute progress in Civil Engineering. Last not least, I am more than happy and have every confidence, this nature of effort—an initiation in one of many innovative academic —will continue in the days to come.

- Er. Kishor Bagale Thapa

INTRODUCTION

Himalaya Civil Club (HCC) is the active group of society of civil engineering students of Himalaya College of Engineering established on 2068 BS. It is organized to contribute on the career benefits of students, facilitate them with platform to enhance their creativity and skills beyond the academic career and helping them to interact on the real field scenario updating their knowledge with current affairs and so on. HCC has been doing different activities on the college from the date of establishment and running seminars, workshop trainings and different competitions.

Amit Neupane

MESSAGE FROM PRESIDENT

Its great pleasure to introduce civil magazine by Himalaya Civil Club with an objective of emphasizing and upgrading knowledge of civil engineering students and updating them with the current global scenario in the field of civil constructions, development and researches.
HCC has been conducting different skill and career enhancement programmes, seminars and competitions for the benefits of civil engineering students. The semi-annual publication of civil magazine is believed to create platform, impart innovative ideas and amplify knowledge of civil engineering students.

For the successful publication of this magazine, I am indebted to directors Kishor Gautam, Asst. Prof. Manoj Thapa and Purna Bhadra Aryal, Chintamani Pokhrel (Principal), Er. Kishor Bagale Thapa (Head of Civil Engineering Department), Er. Bipul Shrestha (Head of Career Development Department), Asst. Prof. Rupnarayan Shrestha (English Lecturer), Chiranjibi Devkota (Administrative Officer) and to our committee members, all teachers, friends, seniors and juniors for their continuous support and hearten effort on making this magazine possible in your hand.

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WHY WE NEED
SHIFT IN TO ECOLOGICAL SANITATION SYSTEM

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The quality of drinking water and sanitation facilities are related to good health and sound environment. In developed country this connection is taken for granted, but in the developing world poor water supply and sanitation remains one of the leading causes of illness and death. According to the WHO/UNICEF (2000), every year about 2.2 million people die from diarrhoea, mostly children. Improving hygiene, water supply and sanitation could control this enormous disease burden. One of the primary causes of contamination of water is the inadequate or improper disposal of human and animal excreta. This often leads to a cycle of infection and contamination.

Pathogens and parasites found in human excreta, if ingested, can result in a variety of illnesses, including diarrhoea leading to malnutrition. If left untreated these illnesses can result in poor growth, iron deficiency (anemia), vitamin A deficiency, and leave the body's immune system weakened and susceptible to more serious infections. Not all pathogens and parasites result in death, but the resulting malnutrition creates persistent poor health and a predisposition to disease and death from other causes.

Conventional sanitation system

For most people sanitation means sitting on a toilet and flushing away the excreta to waste or simply sitting or squatting on a pit toilet and letting the waste matter build up in a pit. In both cases the excreta is disposed of and forgotten in the quickest and most convenient way.

Conventional sanitation is currently offered by two models: pitsan (pit toilets) or flushsan (flush toilets). Although conventional sewage systems transport excreta away from the toilet user, they fail to contain and sanitize, instead releasing pathogens and nutrients into the downstream environment. This is considered the "linear pathogen flow". These systems mix faeces, urine, flush water and toilet paper with grey water, storm water and industrial effluents and ultimately all sewage systems contaminate the environment.

The design of these technologies is based on the premise that excreta is a waste and that waste is only suitable for disposal. It also assumes that the environment can assimilate this waste. This sanitation systems transport the excreta and other wastewater away form urban areas and thereby improve the public health of the urban population. When this resulted in the heavy pollution of water bodies, such as rivers and seas, wastewater treatment plants were added to the system to protect the environment and water sources. The technologies are very high in investment, maintenance and operation costs.

Need for a shift to ecological models

The conventional systems do not provide a solution to wastewater management and sanitation, because the health of the individual and the community as a whole is still endangered as explained above. The conventional system is becoming more difficult, because water is used for transportation of the waste. Clean water is too precious to be flushed down the toilet. Another problem is that the nutrients and trace elements that are present in excreta (through the food that is consumed by the people) are not channeled back into the agriculture fields. Mostly they end up (along with the waste water) in water bodies where they become unusable and polluting or the nutrients and trace elements remain concentrated and covered up in a hole in the ground. Therefore, changes in the conventional sanitation and wastewater systems and adaptation to more sustainable practices for sanitation are needed in order to make recycling economically viable. Ecological sanitation is an approach that regards human excreta and wastewater not as waste but as a resource that should be made available for reuse.

Ecological sanitation (ECOSAN) is a system that makes use of human excreta and turns it into something useful, where the available nutrients can be recycled in

agriculture to enhance food production, with minimal risk of pollution of the environment and with minimal threat to human health

ECOSAN is a concept that believes that sanitation problems could be solved more sustainably and efficiently if the resources contained in excreta and wastewater were recovered and used rather than discharged into the water bodies and the surrounding environment. The concept thus recognizes human excreta and water from households not as waste but as resources that can be recovered, treated where necessary and safely used again. The objective is to protect human health & the environment while reducing the use of water in sanitation systems & recycling nutrients to help reduce the need for artificial fertilizers in agriculture.

The Ecosan concept does not deal with any specific technology, but is made up of a combination of specially designed technological components that are considered as ecologically sustainable when used as a combination. In general, ecosan projects are either carried out on site (at the site of flowstream production) or off site (away from the location where excreta is use in agriculture)

The Ecosan concept is all about the recovery and reuse of the nutrients present in human excreta and wastewaters, as opposed to the discharging of these nutrients. The reuse of these nutrients thus serves as an alternative source of nutrient enrichment which replaces the dependence on fertilizers for crop production. The human excreta which is rich in organic matter and nutrients, mostly nitrogen and phosphorus, can be collected, composted and applied directly as fertilizer and soil conditioner in agriculture.

Urine is generally believed to contain more nutrients than faeces and does not require much time for storage/ treatment as the faeces. Urine is rich and typically contains more than 50% of the nitrogen, phosphorus and potassium content of whole human waste and is widely considered as good as or better than commercially?available chemical fertilizers or stabilized sludge from sewage plants. Urine can be either applied directly in farming as nutrient enrichment, or as part of composting; to increase the nitrogen content, aid the composting process and increasing its final nutrient values.

Sikta Irrigation Project, Banke-Bardiya, consists 233-km-long sub-canals. Once its 28-km section comes into operation, 1,800 hectares of farmland will be irrigated.

A case study on

The Banqiao Reservoir Dam Failure:

Jeeban Regmi (HCOE, 2066 Batch)
Engineer
Kathmandu Metropolitian City

Balbhadra Adhikari
Engineer
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Background

Until 2000; there were 22,104 dams over the height of 15 m operating in China. Most of which were built during low construction quality era of China. The Banqiao Reservoir Dam is one of them with following descriptions;

Name of Dam: Banqiao Reservoir Dam
Height of Dam: 24.5-meter
Location: River Ru, Henan province
Country: China
Commissioned date: June, 1952
Constructed between: April, 1951 and June, 1952
Date of Failure: 8 August, 1975
Affected Area: 10,000 square kilometers
Killed People: 171,000 (some reports claim 230,000)
Affected People: 11 Million

The Banqiao Reservoir Dam was built between April, 1951 and June, 1952 located on the River Ru in the Zhumadian Prefecture (like district or town) of the Chinese Henan province, failed in 1975, killing an estimated 171,000 people (although some reports estimate that number to be as high as 230,000) and destroying the homes of 11 million people. It is considered to be the biggest dam failure in history of dam failures, with more casualties than any other dam failure.

Banqiao Reservoir reconstruction was considered a crucial national project in The Seventh Five-Year Plan of China, so, it was reconstructed and rebuilding project lasted from the end of 1986 to June 5, 1993. Noticeable thing is that this worst incident in the history of Dam breach was in the aftermath of the third typhoon that had decimated China that year.

Description of the event

The Banqiao Reservoir Dam was designed to withstand a large flood that can be created by 300 mm of rain falls per day, which is a rainfall of 1,000-years return period of the area of dam construction. Zhumadian city, which was completely erased in this disaster, had built more than 100 new dams between 1956 and 1957. However, since the government placed far more importance on capacity than discharging, many dams were built below the designed standard of flood prevention, according to Chen Xing, the former general engineer of the Henan Provincial Water Resources Bureau. He revealed in his memoir that the local government made repeated efforts to reduce the number of vents on the sluice gates in order to enlarge the reservoir's capacity. Banqiao Reservoir Dam and 61 other dams were breached on August 8, 1975.

Heavy rainfall started on 6 August 1975. Rainfall records indicate that 189.5 mm of water fell every hour, amounting to 1,060 mm per day and continued for 3rd day on which Dam breached. That time rainfall exceeded the province`s average annual rainfall, which is only around 800 mm. The weather department called it a rainfall with 2000 years return period.

Chances of the devastating flood was noticed on initial day of rainfall on August 6, a request was made to open the dam but was rejected due to an already existing flood in downstream areas.

By August 7, the request was granted by telegrams, which failed to get to the proper authorities. Late on August 7, Unit 34450 of the People`s Liberation Army telegraphed the very first warning for the dam failure, but in a matter of only three hours, the Shimantan Dam broke and within 30 minutes, the water from that dam crested at the Banqiao Dam.

On August 8, 1975, the 24.5-meter Banqiao Reservoir Dam was breached. Over 700 million cubic meters of floodwater was released over the course of six

hours. The Daowencheng Commune located downstream was immediately erased from history and 9,600 people were killed instantly.

Following the breach of Banqiao Dam, total 61 other dams in 61 reservoirs located in the area broke one after another, It was termed "CHAIN-REACTING FAILURES", which released another six billion cubic meters of floodwater, all to an area measuring 10,000 square kilometers. Survivors recall that the dam bursting sounded like the sky above had collapsed and that the earth itself was cracking. Anyone who survived the initial flooding was trapped without access to food or clean water and contaminated water caused illness throughout the area. 26,000 deaths were attributed to the floodwaters, while nearly 145,000 people lost their lives because of epidemics and famine. In total, around 5,960,000 structures were

(Start of Banqiao Reservoir Dam breach)

(After 6 hours of breach of Banqiao Reservoir Dam)

Some causes of failures evident from studies and trusted till date are;

- Bad weather and inadequate and untimely decision to open the dam.
- After years of studying the incident, researchers concluded that Dams were all built with principles pertaining to the containment of the river but not for flood control i.e. emergency release were not so focused during design and construction.
- Many researchers blame poor weather forecast of that time and all those years.
- During the late 1950s, Scientists warned that reservoir flood control was being ignored and that the irrigation functions of reservoirs were overemphasized. Moreover, China also lacked any early warning system as well as an evacuation plan that could have saved lives.

Conclusion

Most believe that the Banqiao Reservoir Dam breach disaster was not natural event but man made disaster as humans' greed had not stopped until they almost shut down the river with Dam without any plan of flood water release and finally got learning with never compensating loss of lives.

So, today's design must focus these side of dam design too to prevent such a devastating calamity in the future.

Civil Engineering: My Perspective

Parash Panthi (HCOE, 2067 Batch)
Department of Local Infrastructure and Agricultural Roads (DoLIDAR)
Ministry of Federal Affairs and Local Development (MoFALD)
Government of Nepal

Starting through my perspective, I always thought engineering to be basically an art of application of science in the real life. And about Civil Engineering - the oldest of all engineering - I thought it to be a perfect plus free application of all that we studied in civil engineering mechanics like applied mechanics, dynamics, hydraulics, soil mechanics, survey, structures, hydrology, earthquake engineering, construction management, etc. in our everyday lives. I thought we could apply all those science of mechanics much comfortably, without any hesitation, in our practical life.

Talking about Nepal, topography and distribution of various resources is a major challenge and opportunity to civil engineer to undergo any infrastructure construction. So, we are very lucky as we have got a lot to learn. There is a special book out there, kept open. In this scenario, we should seriously consider about the methodology of how the jobs are being done and how they are needed to be done. Maybe, we should re-consider our construction practice which are too much divergent from the theoretical ones.

Talking about some time spent as a governmental civil engineer, I am in a different conclusion. I seriously doubt that current practice in civil engineering in various governmental and non-governmental jobs is going to make any drastic change in our immediate future. I think that in governmental and non-governmental actions following points should be seriously considered to expect any drastic change so as to make a golden future we have imagined (we should never forget that we all should effort something from where we are to overcome current laggings) :

i. Firstly, we need to make use of better trained people along with the use of more efficient and modern tools and technologies.

ii. Collaborative relationship between client, consultant, contractor (and suppliers) seems to be more important for making a better working environment. It will enhance the quality of work.

iii. We are in a serious condition of design and construction practice. Design and construction process should be taken more cautiously so as to save unnecessary labor and resource materials in bargain.

iv. Policy should be so made as to energize younger generations and a long term plan should be made to make involvement of youngsters.

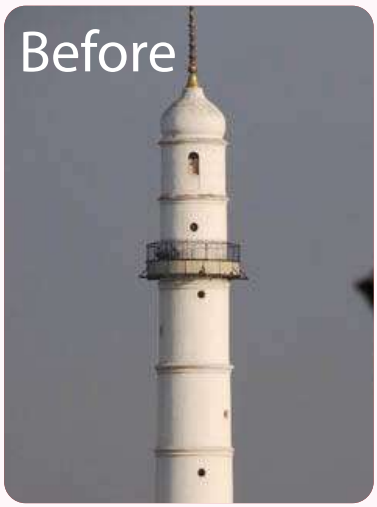
Talking about governmental job scenario (again, as per my perspective), officers have rights not more than just implementing the pre-plan (late or early, right or wrong, equal or biased). Civil service rules and compensation rules of government make it more difficult to (almost impossible) to encourage outstanding performance and discourage poor performance. Alongside, unlike in private sector, there is little or almost no personal gain for taking various risks; whereas, in private sector, there is significant personal gain for taking risks. If only this provision of legal personal gain was made, there would be more expected rise in numbers of energetic personnel in government jobs which would eventually lead in the development of our country leading to imagined Nepal. Due to various restrictions by laws, regulations, policies, etc. prevent prompt actions desirable to be made. As per these restrictions, various actions/jobs to be done have to go through a very long path that no one desires to go through. Hence, these actions/jobs, in private sector, would have been completed in 90% less time than that it takes in governmental sector. Also, individual initiations seem to be discouraged by above mentioned restrictions, which would make more impact if considered. No offense, but if there were no factor of safety applied in our civil engineering theories and formulas, our engineering would have been in a serious condition by now. i.e. factor of safety is our god.

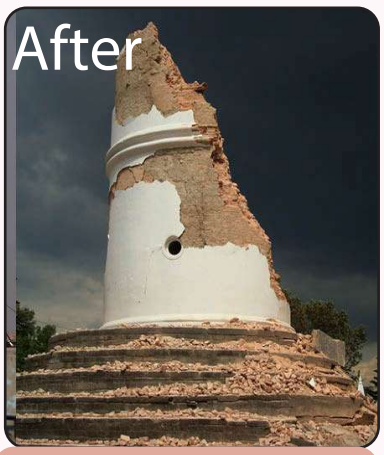
Additionally, What I would like to say besides all these, we all should not deviate from making effort. We must not forget that all the knowledge we got in engineering studies are the basis to do all the civil engineering jobs out there. Without the concept, we are nothing. So, first get the concept, and then go to the field and perform it. The more you try to apply the concept perfectly, the more precisely can do your work.

And, I would like to thank my junior HCOE Civil Club brothers for giving me a chance to express my views in this cover letter. I wish this club to motivate civil engineering students to do various innovative jobs and project. All the best, brothers and sisters!!!!!!!!

Synopsis : Nepal Earthquake

Date	:25 April 2015
Origin time	:11:56:26 NST
Magnitude	:7.8 Mw [34 km ESE of Lamjung, Nepal]
Depth	:8.2 km (5.1 mi)
Epicenter	:28.147°N 84.708°ECoordinates: 28.147°N 84.708°E
Type	:Thrust
Areas affected	: Nepal, India, China, Bangladesh
Total damage	:$10 billion (about 50% of Nepal's nominal GDP)
Max. intensity	:IX (Violent)
Aftershocks	:7.3 Mw on 12 May at 12:50 6.7 Mw on 26 April at 12:54 453 aftershocks of 4 Mw and above until 11th may 2016
Casualties	:8,857 dead in Nepal and 8,964 in total 21,952 injured 3.5 million homeless





Dharahara, killing around 200 people

Horizon Apartment, Basundhara

Six-lane highway, Bhaktapur

Powerhouse

Penstock

Bhotekoshi Hydropower

Basantapur Durbar Square

Civil Engineering in Nepal

Krishna Bahadur Khadka (HCOE, 2066 Batch)
Government Highway Engineer
Ministry of Physical Infrastructure and Transport
Singhdurbar, Kathmandu

Nepal is a developing land-locked country which has wide ranging variation in climatic, geographic, availability of natural resources and so on. The country has 3 regions viz terai, mountain and hill with altitude ranging from 70 m to highest peak of the world 8848 m above MSL. Nepal is the second richest country in the world in water resources. Many beautiful and attractive natural landscapes attracting tourists from all over the world are available. Nepal has number of religious heritage places included in list of UN heritage sites. Despite all of these we Nepalese are unable to move ahead satisfactorily in the direction of prosperity and sustainable development. It is today's essentiality to speed up the development activities synchronizing all available efforts and means of country. Regarding the development of country like Nepal, the role of civil engineers is prominent and they are the backbone for development of the country. Production of prompt, qualified and innovative civil engineers is essential for the achievement of national goal of developing country.

Civil Engineering covers wide range of sectors of development activities like road construction, hydro-power construction, irrigation facility development, water supply and sanitary related works, water resource related works, building and housing construction works, contractual management work, facilitation work, monitoring and auditing works and so on. Each and every development activities initiate through the civil engineers. In the context of Nepal, so many opportunities for civil engineers in contemporary development scenario of the country. Our country is still unable to provide road access to Humala and Dolpa. No smooth and proper road facility to other districts also. So, during survey, design, construction, supervision and monitoring, thousands of engineers may engage in near future. Similarly, though our gross hydro power generation is 83,000 MW, only 887 MW electricity is generated and we are still facing the load shedding. Various national pride hydro power project like Budhi gandadki (1200MW), Naulsing Gad (410 MW) , Upper Seti (240 MW), Dhudkoshi, Arun (900 MW), Upper Karnali and so on project are in ready stage of launching while Upper Tamakoshi(456 MW), Rasuwa Gadhi (111 MW) , Mid Vote Koshi (102 MW), Trisuli 3A (60 MW) and so on small and medium-sized hydro-projects are under construction. During all phases of hydro developments, thousands of civil engineers utilize their skills. Moreover, various irrigation projects like Ranijamara-Kuleria, Sikta irrigation project, Bheri-Babai diversion project, Sunkoshi Kamala diversion project etc. are also under construction phase which also requires number of engineers. Also various other projects like water supply and sanitary project are also undergoing. After the great earthquake (7.6 Richter Scale) dated 12th Baisak 2072, re-construction is going on with lead participation of civil engineers. Many civil engineers are utilizing their efforts for constructing residential buildings, housing apartment and other construction works. Civil engineers are engaging in different sectors of development works. More and more opportunity to civil engineers in government organizations and also in private organizations like consulting firms, NGO/INGO and so on are emerging. Those who want to work abroad also have more opportunity. Numbers of Nepalese civil engineers are working in Dubai, Qatar, Japan, Australia, America and so on. However, few civil engineers are also wandering in market for search of jobs and are also frustrated. The reasons behind this may be the contemporary unstable political scenario, government's priority on constitution making and end peace process rather the development

activity. Further, the incapability, less confidentiality and lack of innovation to up to date technology for smart performance. So, a civil engineer may engage in his professional life as the technical person, manager, facilitator, leader, promoter etc. we must be up dated to modern technology and its use for prompt and smart decision making. Civil engineers should be able to tackle the problems and challenges by using IT technology and various civil engineering related software like Auto Cad, GIS, DTM, Smart Road, Google Pro, SAP, E TAB, HEC-HMS, HEC-RAS and so on. Civil engineers should show their coordinating, co-operating, diplomacy, leadership, managing and monitoring characteristics for achieving tangible outputs.

Finally, I would like to suggest my juniors or my brothers and sisters to engage in their study with priority and also involve in others activities which enhance professional confidence leading you a smart professional civil engineers. At last, I thank all members of Himalaya Civil Club for giving me opportunity to express my views and promoting Club that we initiated.

Civil Engineering Facts:

1. If your house is not shaking during earthquake, run out of the house or else you are most probably going to die.

In case of earthquakes, shock-waves pump a tremendous amount of energy constantly during the whole event into the building through the foundation. This pumped energy should be dissipated out of the building be moving which causes loss of energy in terms of generating some inertial forces, along with some extent of cracking so that it can go into that nonlinear zone and dissipate energy.

2. Earthquakes and Tsunamis

Earthquakes near Japan and eastern countries can create tsunamis as it is a normal fault while earthquake near the coast of Chile and west coast of USA will not. So the Tsunami showed in San Andreas movie is an inaccurate information. There are chances of Tsunami in Alaska but not in San Francisco and that too not at this extent.

3. Technically, diamond is more elastic than rubber as Elastic modulus of Diamond is in the range 1000-1200 GPa whereas that of rubber is approximately 0.1 GPa. This means on application of large loading, diamond may be in the elastic limit but rubber might go beyond it.

4. Failure of steel reinforcement before the failure of concrete is safer as steel failure occurs with signs whereas concrete failure occurs without giving any previous hints. Thus, the structures are designed as under-reinforcement following the Limit state design.

5. Steel loses most of its strength during fire even with a temperature well below its melting point. This is one of the main reasons why the World Trade Center collapsed on 9/11. The 9/11 conspiracy theorists ignore this simple fact and just babble about the jet fuel fire not being hot enough to have melted the steel and ignorantly deduce that the collapse was a result of controlled demolition.

6. High speeds don't cause accidents, different speeds do.

To illustrate, a highway with only cars, all moving at 160+ speeds is less prone to accidents as compared to the one with cars, trucks and other vehicles with variable speeds even if the speed does not exceed, 100.

7. We would be able to save a lot of tax payers' money in the construction and maintenance of public sewer systems if people took shit at different times during the day instead of everyone doing it in the morning. The sewer pipes are currently designed for three times the average flow of sewage to accommodate just that few peak hours of the morning rendering the system redundant at other times.

8. We can literally treat the sewage to an extent that it becomes as good as a bottled mineral water.

9. Every structure that is designed can take 50% more of such load. There is something called 'factor of safety' and it varies from 1.25 to 1.6 depending on our control of materials.

10. The pyramids were not built with stone but artificial stone viz. concrete !!!

Kushal Acharya
071/BCE

The Thirsty Concrete

Rain water and the frequent flash floods that occur due to the overflow of our severely inadequate drainage systems is a well known headache in Kathmandu. Remember the frequent statuses posted by people about going for a rafting trip in Ratna Park of Kathmandu. What if one day all that water could be absorbed by the road instantly, and diverted to an efficient drainage system so that those floods will never occur again? Or even better, what if it could be diverted to a wastewater treatment plant and turned into use for irrigation, firefighting, or even drinking water?

That day might seem a long way off for Nepal, but it could be here sooner than we all think. Thanks to a concrete developed by a company in the UK that effectively "drinks water" as soon as water falls on it. It is called Topmix Permeable and it was developed by a company in the UK called Tarmac.

Traditional sand based concrete is designed to be permeable enough to let 300mm/hour of water through 1m2 area to the ground level, but Topmix Permeable can let water through at the rate of 36,000 mm/hour per m2, i.e at 120 times faster rate. This is achieved by using a technique called "No fine concrete" i.e no fine aggregate (sand) is used. It is made of relatively small aggregates packed together with cement, but loosely enough to let water pass through.

Permeable concrete has been under investigation for more than 50 years. Previously it was only used under road surfaces to help with drainage. What makes this new concrete especially useful is that unlike its previous incarnations, this concrete can withstand loads due to traffic rolling on it without breaking apart. So, it can be used right on the surface of the road.

The system can accommodate three designs: full infiltration, partial infiltration, and full attenuation.

- **Full infiltration** refers to a system where all water goes through Topmix to flow into the soil underneath. It's particularly useful in wet areas that don't need to collect the rainwater.
- **Partial infiltration** involves a semi-permeable barrier beneath Topmix that acts as a drainage system into nearby sewers or waterways - useful when the layer beneath Topmix can't pass the water through on its own.
- **Full attenuation** uses a capture system to store all the water that flows through Topmix. This option is most useful in areas with unclean water and high recycling rates, since the captured water can be reused later. This could be considered the best option for Kathmandu.

Under testing, Topmix offered best results on roads where vehicle speeds were 50 kmph or less with moderate traffic flow. This makes it best for use in city streets of Kathmandu.

The only problem with Topmix is that it cannot be used in areas with very low temperatures, since the water in between the aggregates may freeze and result in destruction of the road surface.

Though the initial cost of installing Topmix can be quite high, since the old roads have to be completely gutted for it to be installed properly, the long-term advantages are quite easy to see. In addition to saving money on frequent repairs of roads due to moisture attack, it also saves people from wading through deep water on the pavements of Kathmandu during the rainy season. Topmix is available for sale only in UK at the moment, but once international sales is available, it should be installed on all roads of Kathmandu.

Sources:

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Anup Marahatta
069/BCE

MOST IMPORTANT SOFTWARES FOR CIVIL ENGINEERS

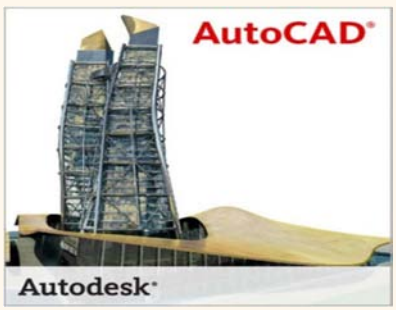
Computer software made our life easy. As a civil engineer it is more fun and enjoyment to use software in profession. It increases our productivity and now we can design and analyse large projects in no time. In this article I'll share such most popular civil engineering software which we most frequently use in our professional life.

1. Microsoft Office

There is no need to explain that how important this software is. It is obvious that none of the person can start his professional career especially office work without knowing the importance and usability of Microsoft Office products like MS Word, MS Excel, MS PowerPoint and list goes on. If you want to become a good Civil Engineer your top most choice for software should be Microsoft Office.

2. " AutoCAD "

The most powerful resource to express your imagination is to write down, to draw or to plot them. But in each and every case you must have a tool and a medium



to show what you think. Same is with the AutoCAD, No doubt it is the most popular Software in Architectural world but it has the same importance for the Civil Engineering as well. As your imagination for structures first comes out from the Layout, Plan, 2D and 3D Views which are made most widely with none of the other but AutoCAD.

3. "Google Skecthup"

For Beginner's or quick need civil engineers we also suggest "Google Sketch up Pro". It is very easy and user friendly because here you have to deal with the tools available with icons which are easy to understand as compared to the commands. You can extrude your 2D into 3D just by picking up a Tool, then just a single click to pull and it's done.

4. SAP 2000:

It's a most popular structural analysis and design software in the civil engineering world. Ideal for design and analysis any type of structure. The main features of SAP 2000 are integrated modeling templates, code-based loading assignments, advanced analysis options, design-optimization procedures and customizable output reports all.

5. GIS

Geographic information systems are maps that give you more than just a flat representation of an area's shape or size. GIS maps can also give you the population, the census tract numbers, the exact size or any other information you need -- as long as you input the data. For engineers, they represent the opportunity to discover what's on, around or under a construction or development site while they save money and improve project management.

Geographic information systems can link geology, history, emergency planning or any other aspect of an engineering project a specific point on a map. You can use GIS to obtain exact sizes of parcels of land, determine what's present on or under the ground, or what happened or is happening at particular locations. For example, Richard III, king of England from 1483 to 1485, died at the battle of Bosworth Field and was buried at the Grey Friars monastery at Leicester, UK, long since demolished. If you enter the coordinates of his tomb into a GIS system, it will show you that the location is currently a public parking lot belonging to the Leicester city council.

6. ETABS

The innovative and revolutionary new ETABS is the ultimate integrated software package for the structural analysis and design of buildings. Incorporating 40 years of continuous research and development, this latest ETABS

offers unmatched 3D object based modeling and visualization tools, blazingly fast linear and nonlinear analytical power, sophisticated and comprehensive design capabilities for a wide-range of materials, and insightful graphic displays, reports, and schematic drawings that allow users to quickly and easily decipher and understand analysis and design results.

Design of steel and concrete frames (with automated optimization), composite beams, composite columns, steel joists, and concrete and masonry shear walls is included, as is the capacity check for steel connections and base plates. Models may be realistically rendered, and all results can be shown directly on the structure. Comprehensive and customizable reports are available for all analysis and design output, and schematic construction drawings of framing plans, schedules, details, and cross-sections may be generated for concrete and steel structures.

7. Smart Road 2009, The Complete Road Desigining Software

Smart Road is a high-end road designing CAD based application that helps users to generate effective and accurate road designs. With an extensive set of features and a simple, easy to use interface Smart Road saves you a lot of time and money by producing automated design and detailing of almost any road type. The software has been developed using state of the art technologies that conform to the highest international standards while also including all standard norms set by The Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR), Department of Roads (DoR). Smart Road offers almost all kinds of road design options. It supports both baseline survey method (DTM) and centerline survey method and covers a wide range of functionalities including functions, data collections, terrain modeling, contouring, volumes, profiles and cross-sections.

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069/BCE

CIVIL ENGINEERING FEATS:

Shanghai Maglev

Japan Railways' latest mag-lev bullet train just broke its own record as the fastest train in the world. The bullet train travelled at 603 kph (374 mph), blowing through last week's top speed of 590 kph (366 mph). At it's fastest, the train covered a mile in 10 seconds, which is insanely fast. This particular maglev train will be able to carry just over 900 passengers per trip as it levitates above the tracks using electromagnets to create a nearly frictionless ride. The world's fasted maglev train used commercially is in Shanghai, China, and reaches speeds up to 431 kph (288 mph).

Hoover Dam

Hoover Dam, once known as Boulder Dam, is a concrete arch-gravity dam in the Black Canyon of the Colorado River, on the border between the U.S. states of Nevada and Arizona. It was constructed between 1931 and 1936 during the Great Depression and was dedicated on September 30, 1935, by President Franklin D. Roosevelt. Its construction was the result of a massive effort involving thousands of workers, and cost over one hundred lives. The dam was controversially named after President Herbert Hoover

Glass Bridge

A terrifying wooden bridge in China has just been replaced by a glass one. This, the world's longest glass-bottomed walkway, is located in Shiniuzhai Geopark in Hunan, and spans 300m (984f) and is 180m (590f) above ground. The floor is made of double-layered glass that is 24mm (0.94in), and is reportedly 25 times stronger than regular window glass.

The bridge had previously been made of wood, linking the two peaks of Stone Buddha Mountain, but 11 engineers working 12 hours a day converted it to glass. Previously, you were considered brave if you steeled yourself to cross the wooden walkway; now, with its glass bottom, the bridge is already being referred to as "hero bridge."

Three Gorges Dam

The Three Gorges Dam is a hydroelectric dam that spans the Yangtze River by the town of Sandouping, located in China. The Three Gorges Dam is the world's largest power station in terms of installed capacity (22,500 MW). Not only does it produce electricity for the area, it also increases shipping capacity and provides flood storage space. Construction of the dam began in 1994; it opened for commercial operation in 2008.