In sync with sustainability

In conversation with Prof. Dr. A.F.M. Saiful Amin, Department of Civil Engineering, (BUET)

By Osama Rahman

GIVEN the haphazard growth of the current capital city, Dhaka, the question of sustainable development has become a pressing concern. With the advent of a new Detailed Area Plan for Dhaka Metropolitan, it is now the right time to explore the issues of sustainable engineering and construction. Prof. Dr. A.F.M. Saiful Amin, Department of Civil Engineering, Bangladesh University of Engineering and Technology (BUET), recently addressed these very issues, explaining the concept of sustainability in terms of engineering whilst highlighting the areas that those in charge with preparing the fresh Detailed Area Plan need to look into.

"Firstly, before understanding sustainability, one must first grasp the notion of development. Development, in simple terms, is improvement in Human Development Index. Development, thus is simply improving what is already there," he began. "Social or physical development must go hand in hand with social emancipation. The only way development can even be considered sustainable is only when society itself decides to take charge of what is being developed," he said. One of his favourite examples of society taking charge of such development project is that of Hardinge Bridge. Hardinge Bridge located at Padma located at Paksey in western Bangladesh was constructed in the year 1912. "It created what is till today an extremely important and strategic location. The project was a resounding success and this was simply because the locals in the area realised its importance and worked for it with gusto." The walkways next to the bridge, the second largest bridge in Bangladesh, helped connect even pedestrians over the stretch of the mighty Padma and allowed easier movement of goods and people. "Economically, it was very important and thus the people were fully committed to it. Its construction led to the development of the area and we continue to reap the benefits of Hardinge Bridge to this day, showing just how sustainable it was," Professor Saiful explained.

This acceptance and support from society is the first step to sustainable development and nurturing this acceptance is the role of civil engineers, Professor Saiful opined. "So the first thing one must think of is planning for society," he continued. "The next part is the design. Think of any building like a human being; for the first 18 years of its life, it expects a lot of thinks. Then it can function on its own for say another 60 years after which it again needs to be looked after." Thus, sustainable construction must take into account the lifecycle of any building and design accordingly, knowing that repairs and reconstruction are necessary for keeping the structure at full strength. Professor Saiful then pointed out other important things that need to be done to not only preserve a building's structure but rather its capacity to function. "There will be a need for day to day maintenance and costs will rise and demand immediate repairs and monitoring," he explained. "One must also understand the operational manual, abide by it and pay close attention to not doing something that may be beyond the structure's capacity," he added.

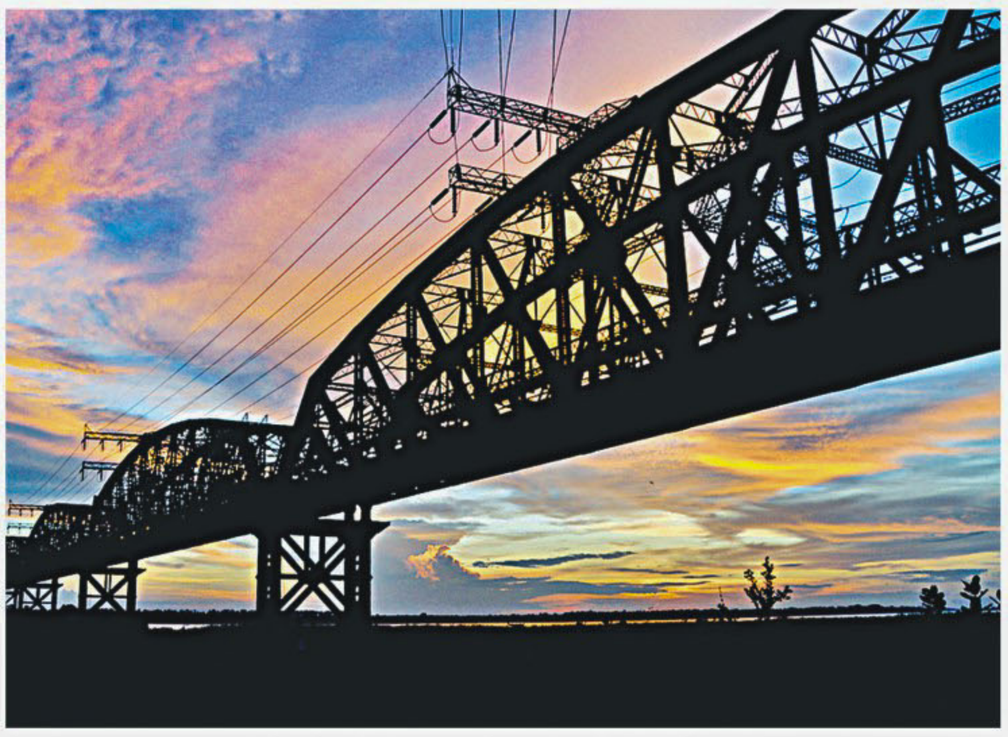
The idea of capacity inevitable brought up questions of resiliency. How can we ensure a building is resilient? "The engineer's biggest challenge is to ensure harmony between his designs and nature's. Consider a tree; it is strong and broad in its foundations but the barks grow less thicker the higher we go. This is called balance and helps maintain the basic structure of the tree against wind, water and other elements," he said. "Nature has the capacity to recover from adversity and a building must be designed thinking the same," he proposed.

As the discussion turned towards sustainable construction materials, the mood changed into even more seriousness. "We do not have the needed rocks under our soil in Bangladesh. This can be alarming and the best reason to understand why is to look at the Jamuna river and realise that it changed its course and no one can say why," he pointed out. Such changes in a water body's course can have a detrimental effect on the surrounding areas and may make the soil even weaker, given the lack of rocks. "Bangladesh has a material scarcity and as we do not have hard rocks, we use sand to make bricks which are then used as concrete. This is of course not the best nor the safest practice," he warned. "End of the day, our concrete is still like clay and if we go on extracting raw materials at the current rate, we must not do so without considering the implications on the environment," he declared. "In terms of construction, one must pay attention to efficient use of materials. One mustn't think only in Lifestyle costs but also monetary costs," he said. His most important advise though was to salvage waste and use as many recoverable materials as possible for a sustainable project.

> *"There must be open channels of communication between the designer of a building and the user. Both must explain what they want out of the building and how it can be achieved"*

As we drew towards the end of our discussion, Professor Saiful then gave some advice to those wish to engage in construction. "There must be open channels of communication between the designer of a building and the user. Both must explain what they want out of the building and how it can be achieved," he said. He also pointed out that at the current rate that new flats are sprouting all over the city, it will eventually lead to chaos. "Like I mentioned, every building has a life span. What happens in 50 years when majority of the buildings need to be reconstructed? How many of the flat owners will foot the bill? And how will such properties be divided as inheritance?" he wondered out loud. He postulated the need for a branch of social science to start planning for this very scenario and advised that successful models implemented in places like Tokyo and New York ought to be studied. "End of the day it is society that will play the most vital role. It will be the civilians who must bring about a social transformation by taking baby steps. Leave 6 inches space for your neighbour and expect him to do the same and soon there will pockets of space that will help the city breathe better," he said.

Professor Saiful identified many critical areas that need urgent attention. However, an optimist in the end, he explained that Bangladesh is still relatively a very new country and all countries have already faced the problems currently facing us. "We need to look at the models of those who have already been where we are and how they tackled it and then we need to tailor those activities for our country," he said. If done right, Professor Saiful believes that Dhaka can easily be one of the most liveable cities in the world. However for that to happen, we must all do our part and not expect state bodies to bear the brunt of what needs to be done.



Hardinge Bridge on Padma located at Paksey.

How to ensure the qualities of building construction materials

A home of our own is the dream and necessity of everyone. A home brings about social status and dignity. But above all else it provides shelter and protection from natural disasters like cyclone, flood, earthquake etc. It's a enclosure of comfort and durability which isn't always possible if not done right.

For instance, during winter, a house made up of CGI sheet (locally called Dhew Tin) serves less protection from bitter cold than that of a house built with Reinforced Cement Concrete-RCC (locally called Pukka Bari) or even the house made with mud. The latter two structures retain heat that is much needed in winter. But even what we call the Pukka Bari may turn into a hub of irritation and hypertension unless the stakeholders (the home owners and engineers) choose the appropriate construction materials during its construction.

It is very crucial part of home building process to select the proper material and ensure their quality before incorporating them in construction works. This selection procedure must have scientific basis. It has to be confirmed that the materials that are going to be used in building construction works have been tested in laboratory and re-tested in field level.

A graduate civil engineer prepares a structural drawing in which he/she mentions the properties of all materials to be used in a building construction project. Prior to beginning of the erection works some samples of all materials (rod, cement, sand, stone chips but not concrete) specified by an engineer who will supervise the construction works, have to be sent to laboratory for testing the specimens. The lab authority will provide reports for individual materials mentioning the test results of the specimens. Then the engineer in charge will check the test result weather they comply with values that are mentioned in the design/drawings or not. If the test result shows inferior values to that is already mentioned in the supplied design/drawings, the engineers in charge deny allowing the materials to use in the construction works.

The main property of reinforcing steel (rod) that is required in constriction work is its tensile strength. Normally, this property represents its ability to resist tensile force and it is measured by dividing the tensile force that a steel specimen can resist until its rupture by the specimens cross-sectional area. According to engineers, strength of steel means its yield strength and it is tested in a physical testing or concrete laboratory by means of highly sophisticated equipment named Universal Testing Machine (UTM). Yield strength is also termed as the grade of steel. Another vital property of the rod is its size which is the measurement of its diameter. This is generally checked on-field by the engineer in-charge and does not need laboratory test.

Unlike rods, the major property of concrete that is required in construction work is its compressive strength. Normally, this property represents its ability to resist compressive force and it is measured by dividing the compressive force that a concrete specimen (cylindrical or rectangular in shape) can resist until it is crushing by the specimens cross-sectional area. This property is tested in a physical testing or concrete laboratory by means of Universal Testing Machine (UTM) also.

In the structural design, the design engineer guides the mix proportion for ingredients of concrete. The designer suggests not only concrete but also the properties of constituents (cement, stone chips, sand and even water) of the concrete to be used in mix. Among the constituents, normally cement, stone chips and sand are tested in laboratory. The water is tested in field level. Interesting thing is that it is not necessary to be an expert to test the quality of water. All drinkable water can be used in construction works. An engineer or a group of engineers who supervise the filed works follow the guidance of the design/drawing. Concrete is prepared in the filed by mixing the components following the suggested mix ratio of the design/drawing. Some concrete is taken from the first mix to prepare cylindrical specimen for laboratory test. The authority of laboratory provides the test result within 5 to 30 days depending upon the requirements of engineer in charge.

In Bangladesh there have many institutes where building construction materials can be tested. Most of the institutes have very nice lab facilities. Among them Housing and Building Research Institute (HBRI), is the only research organization in the field of building construction in Bangladesh which has well-equipped laboratories and experienced staff. All types of construction material can be tested there. Other than HBRI, there have several organizations providing material test facilities namely Bangladesh University of Engineering and Technology (BUET), Local Government Engineering Department Laboratory and so forth. In Chittagong, Khulna, Rajshahi and Sylhet divisional cities testing facilities are available in CUET (Chittagong University of Engineering and Technology), KUET(Khulna University of Engineering and Technology), RUET (Rajshahi University of Engineering & Technology) and SUST (Shahjalal University of Science & Technology) respectively. Apart from this, most of the public polytechnic institutes have limited testing facilities as well.

Safety Everyday

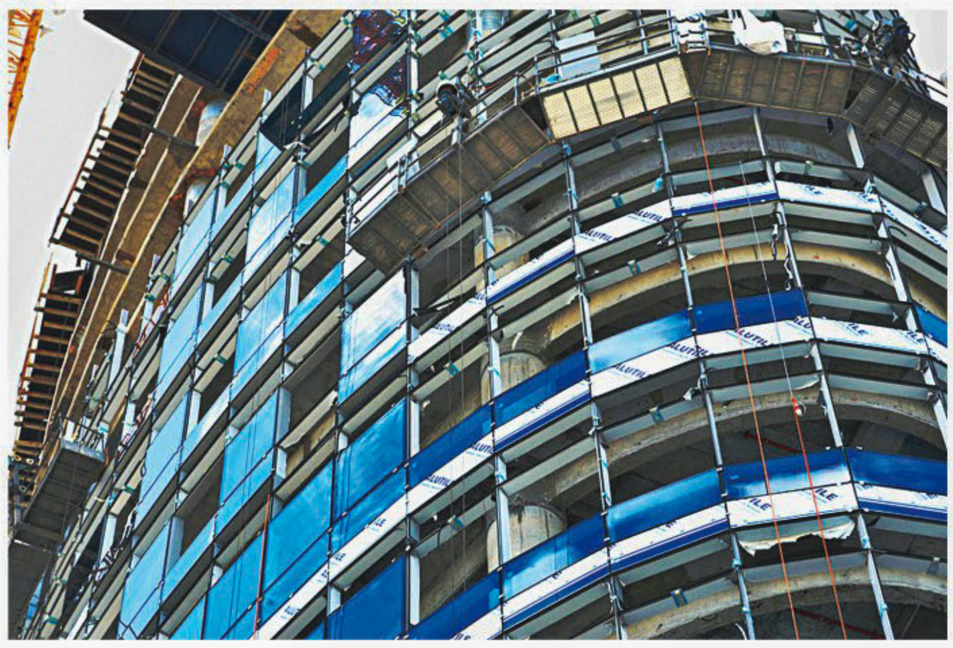
Engr. Kalimur Rahman.

WE are confronted with the warning sign of "SAFETY FIRST" in front of buildings under construction or if there is some road repair work going on. Perhaps most of us never stop to reflect on the importance of this seemingly very simple, sometimes mandatory sign.

At home, this sign has equal importance. The electrical gadgets that we use everyday at home are perhaps the most threatening . In addition, the pressure cooker, the razor or even a simple medicine that one uses can be lethal. This is where a sense of "safety" or "safety awareness" comes in.

A medicine which is a life saver for one could be a life taker for someone else. A small child can swallow some medicines which will threaten her life or even an adult could mistakenly take the unintended medicine and put his life into risk. A razor with some rust on it could lead to serious complications which may result in death. A pressure cooker with defective safety device or seals could lead to serious injuries like multiple burns etc. These are some small examples of what could happen from seemingly harmless equipment or habits and if the "Safety Awareness" is present then one could avoid many accidents from simple things that can change the entire course of one's life or even take a life.

Electricity is one thing which we are becoming increasingly dependent on. From mobile phone chargers to kitchen appliances or items like refrigerator,TV etc. are a part of homes in cities to villages. In remote areas also we are now using solar panels which help run lights and fans. An electric shock can be a serious hazard for the users . Proper "earthing" of equipment can be a life saver. "Earthing" actually is the third wire in 3 pin plugs and takes care of the hazard by passing to earth any live exposed part of the equipment, that has been caused by some defect. This can be further explained by an



Under construction safety

SLAG Base Cement – New Horizon for ...

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Environmental benefits

Production of slag cement creates a value-added product from a material—blast furnace slag—that otherwise might be destined for disposal. Not only does the making of slag cement lessen the burden on landfills, but it also reduces air emissions at steel plants through the granulation process (as compared to the traditional air cooling process). Use of slag cement in concrete reduces the environmental impact of concrete by:

- Reducing greenhouse gas emissions by eliminating approximately one ton of carbon dioxide for each ton of portland cement replaced.
- Reducing energy consumption, since a ton of slag cement requires nearly 90% less energy to produce than a ton of portland cement.
- Reducing the amount of virgin material extracted to make concrete.
- Reducing the "urban heat island" effect by making concrete lighter in color thus reflecting more light and cooling structures and pavements with exposed concrete.

Considering versatile benefits of slag cement, Bashundhara Group launched slag based PCC cement in market. Cement Sector, Bashundhara Group, over the last two decades maintain highest quality cement and proved its consistency again and again by supplying cement to the most iconic projects of Bangladesh. Projects like-Padma Multipurpose Approach Road Project, Padma Main Bridge Project, Padma River Training Projects, Seventh China Bangladesh Friendship Bridge, Mogbazar Flyover, Mega Power Plant Projects, and Others Government Residential/Commercial projects are using Bashundhara Cement exclusively which proves its superiority over others.

Bashundhara Group with its continuous product improvement, modification, technological improvement and years of experience, ensures customers satisfaction and the group is fully committed to sustain this reputation in the future.

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